

DISTRIBUTION

JUL 18 1946

LOS ANGELES PUBLIC LIBRARY

Sci
SCIENCE AND INDUSTRY
JULY, 1946

AGE

THAT INTEGRATES ALL PHASES OF DISTRIBUTION

STACKS

REFERENCE
DO NOT LOAN

THIS MONTH **MATERIALS HANDLING** In Relation to TRANSPORTATION • MARKETING • FINANCE • INSURANCE
PACKING and PACKAGING • WAREHOUSING • SERVICE and MAINTENANCE

SAVE ENERGY . . . SAVE 30% to 60%
IN HANDLING MATERIALS!

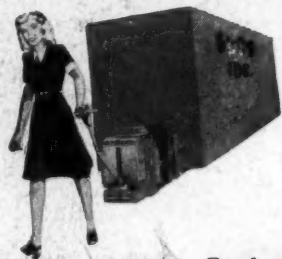


No matter what your product, there is an Automatic Fork Truck that will amaze you with its adaptability to handle any type of material in any kind of lifting, moving or stacking operation.

These trucks replace many hand trucks—provide you with extra storage space—are perfect feeders for production lines.

The record of those who use them shows handling costs cut 30% to 60%—workers enthusiastically efficient with their new-found freedom from gruelling, back-breaking work. Mail coupon for complete information.

WITH Automatic FORK TRUCKS

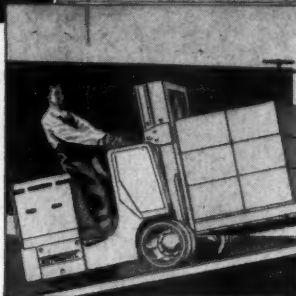


Amazing New Postwar Transporter

Don't buy any motorized hand truck until you see the new Postwar Transporter. Three easy, quick pumps of the foot pedal lift the load sufficiently to move with "touch-of-your-thumb" to move with "touch-of-your-thumb" ease. Easy to get at power unit—new safety brake action. New efficiency, longer life has been added to this Miracle Electric Truck that cuts handling costs up to one-half! Mail coupon.

Automatic
ELECTRIC TRUCKS

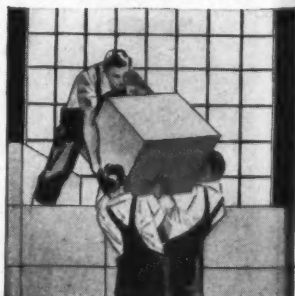
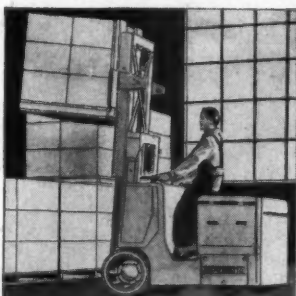
Lighten
LIFE'S LOADS



THE RIGHT WAY



THE WRONG WAY



AUTOMATIC TRANSPORTATION COMPANY Div. of The Ford & Son Corp., Inc.
115 West 87th Street—Dept. K, Chicago 20, Ill.

Please mail me without obligation, complete facts about Automatic Fork Trucks.

☐ New Postwar Transporter

☐ Have an A.T.C. Specialist survey my material handling costs

Company Name.....

By.....

Street Address.....

City.....

Position.....

State.....

BAKER *Articulated* FORK TRUCK places loads at RIGHT ANGLES to 7 ft. AISLES!



LEFT — Baker Articulated Fork Truck operating in narrow aisle, placing load at right angle to 7 ft. aisle.

RIGHT — 12 inch rubber tires of Baker Articulated Fork Truck enable it to turn easily in tight spaces.



A striking example of the Baker *Articulated* Fork Truck's successful operation in congested areas is the case of the locomotive division of a large electrical manufacturer. In this plant, heavy parts are handled on pallets between manufacturing processes. Conventional power trucks could not be used effectively because many of the aisles were only 7 ft. wide. BAKER *Articulated* Fork Trucks satisfactorily solved the problem, enabling the company to mechanize handling operations without costly plant alterations.

For complete information on Baker *Articulated* Fork Trucks get in touch with your nearest Baker representative—or write us direct.



Members:
Electric Industrial
Truck Association

BAKER INDUSTRIAL TRUCK DIVISION
of The Baker-Raulang Company
2176 WEST 25TH STREET • CLEVELAND, OHIO
In Canada: Railway and Power Engineering Corporation, Ltd.

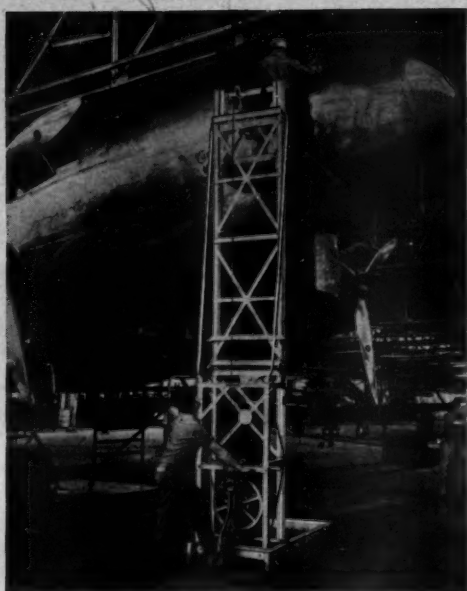
Baker INDUSTRIAL TRUCKS

ECONOMY LIFTERS

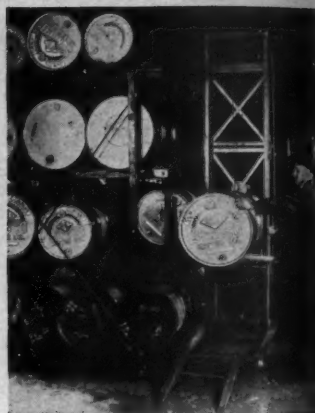
speed material handling



Stacking Cotton



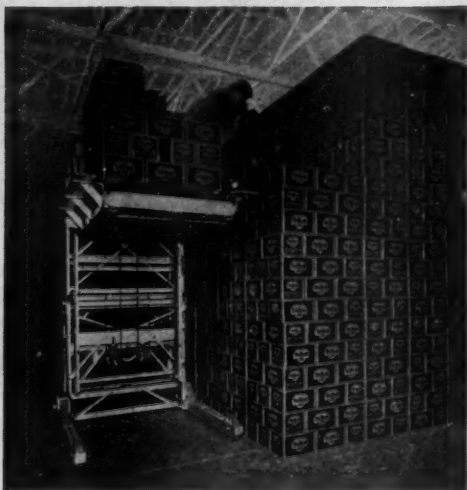
Servicing Aircraft



Drum Storage



Loading Trucks



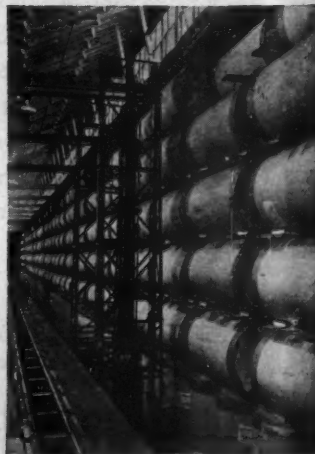
Warehousing Cartons



Racking Hogsheads



Drum Tilter



Stacking Newsprint

**ECONOMY
ENGINEERING
COMPANY**

2661 W. Van Buren St.
Chicago, Illinois



THIS MONTH'S COVER shows three major principles of materials handling ... lift, shift and carry.

H. S. WEBSTER, JR.
Vice-President and General Manager

CHARLES DOWNES
Editor

GEORGE POST
Assistant Manager

o o o

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o o o

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JULY, 1946

VOL. 45, NO. 7

DISTRIBUTION AGE

JULY, 1946

THE MAGAZINE THAT INTEGRATES ALL PHASES OF DISTRIBUTION

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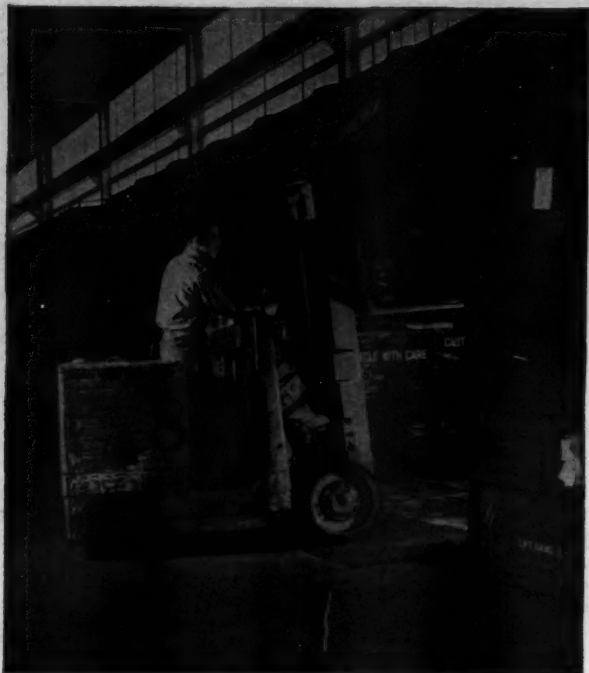
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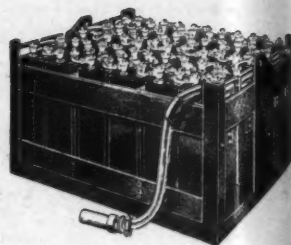
BASIC POLICY

EVERY business is engaged in and affected by distribution. All firms, industrial and mercantile, are shippers as well as receivers; all use transportation; all are confronted with handling and packing problems; all are concerned to some extent with the proper storage of raw materials or finished products; all have to deal with vexing financial and marketing questions; all need insurance; all have to consider service and maintenance of one kind or another. These are all phases of distribution, which begins before production with the movement of raw materials, and continues after production until a finished product reaches its ultimate destination, the final user or consumer.

DISTRIBUTION AGE believes that costs can be cut by better integration of all phases of distribution; that a part of the resultant savings should be passed on to consumers to increase buying power; that by intelligent simplification and standardization of methods and practices distribution can be made more efficient and profitable in all branches of commerce and industry. The policy of this publication is to assist business management in the attainment of those objectives.



BATTERY TRUCKS
work without
"fussing and fuming"



...ALKALINE BATTERIES give most trouble-free power

THERE is nothing temperamental about battery industrial trucks. Battery power and electric-motor drives give them instant self-starting, rapid yet smooth acceleration, and quiet fume-free operation. This makes for safe tiering, safe handling of fragile loads, safe operation in confined quarters or in the presence of fire hazards.

In addition to instant self-starting, battery industrial trucks consume no power during stops. This makes for high power efficiency in the stop-and-go service that is inherent in material handling work. And the current used for battery charging is low-cost power.

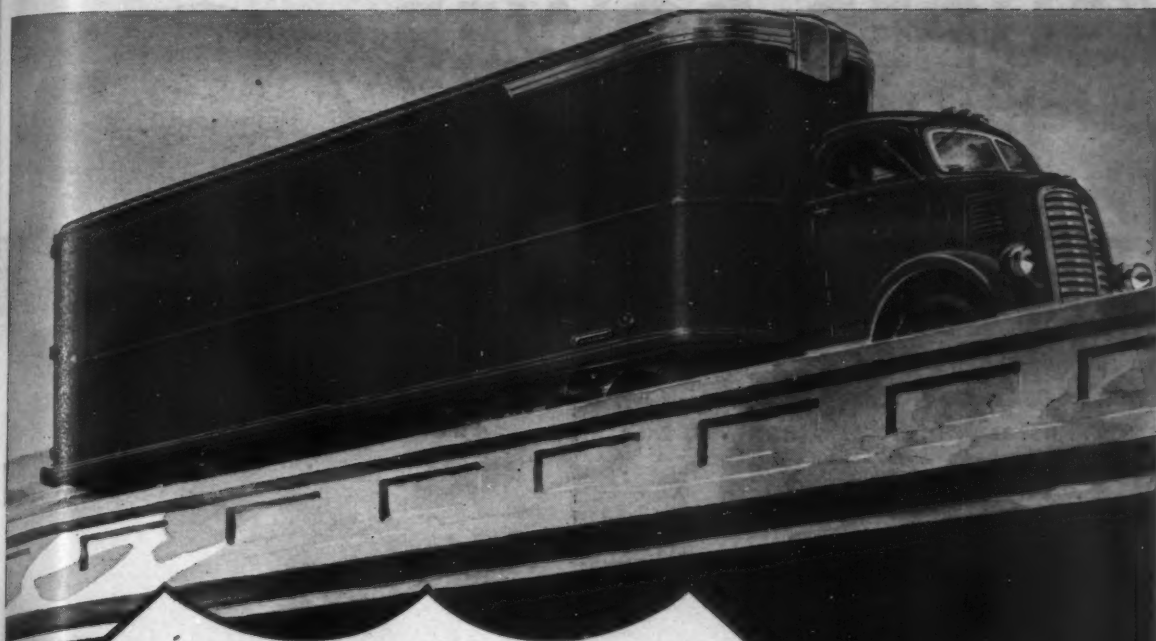
Electric motor drives have a minimum of wearing parts, thus minimizing maintenance,

repairs and time out of service. With batteries exchanged at intervals of 8 to 12 hours, battery industrial trucks, in actual practice, give round-the-clock operation with a day-after-day regularity that you can hardly believe possible until you have had experience with them.

Altogether the battery truck is an inherently dependable and economical material handling machine... especially when powered by Edison Alkaline Batteries. With steel-cell construction, a solution that is a preservative of steel and an electrochemical principle of operation that is fool-proof, alkaline batteries are the most durable, longest-lived and most trouble-free of all batteries. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. In Canada: International Equipment Company, Limited, Montreal and Toronto.

Edison

ALKALINE BATTERIES



"HIGHWAYS" keep pace with motor transport progress

For more than a quarter-century Highway trailer engineers have prided themselves on building trailers "ahead of the times." They have made it their business to know the changing needs of motor transport, and to anticipate new developments by pioneering trailer improvements all along the line.

Today's new Highway "Clippers" and "Freightmasters" are the proudest achievements of the modern Highway factories. In easy handling, in operating economy, in ability to stand up through extra years of hard service, we believe these latest Highways to be the finest trailers ever built.

Remember that Highway Trailers are *manufactured* by Highway—not merely assembled. Write today for complete information on Highway's many points of superiority and learn why it will pay to "let your next trailers be Highways."

HIGHWAY TRAILER COMPANY

General Offices, Edgerton, Wisconsin

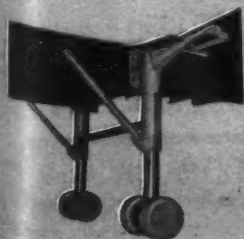
Factories at: Edgerton, Wis., Stoughton, Wis., Farmingdale, L. I., N. Y.

Commercial Truck Trailers • Earth Boring Machines
Winches and other Public Utility Equipment

On Every



Highway



New vertical type jack supports with dual wheels are engineered to rigid Highway standards for long life in heavy duty service.

HIGHWAY

AMERICA'S QUALITY

TRAILERS

"SUPER POWER Helps Davidson Maintain a 50-Year Reputation *For Dependability*"

... B. D. Davidson, Vice President, Davidson, Transfer & Storage Company, Baltimore, Md.

A HALF CENTURY AGO, I. W. Davidson started a draying business with a single horse and wagon. Since that time, the Davidson Transfer & Storage Co., through 50 years of continuous service has paralleled the remarkable growth of highway transportation. Many of the original customers are still using the Company's facilities . . . a fitting testimonial of the Davidson "reputation for dependability."

The Company has been privileged to handle many unusual hauls. One of the most outstanding was a "top drawer" secret during the war when eight trailer loads of maps for the African invasion were transported on short notice from Washington to New York with 100% security. On another occasion, the Davidson company engineered the moving of a half million books from Baltimore's Enoch Pratt Free Library into temporary quarters and then back again. This job was handled so skillfully that no book was out of service longer than eight hours.

The first White truck was purchased in 1920—now, fifty Whites operate in the Davidson fleet. "During the last two years they have rolled up over five million miles—dependably and economically," says Mr. Davidson. "The dependable performance and low maintenance costs over high mileages have convinced us of the superiority of White Super Power."

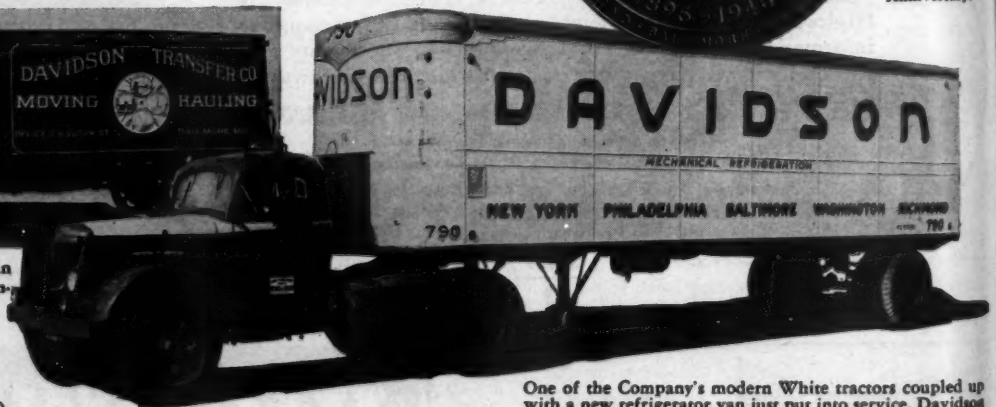
THE WHITE MOTOR COMPANY • Cleveland



B. D. Davidson, Vice President of the Davidson Transfer & Storage Company and Regional Vice President of the A. T. A. Left: A medal which the Company had struck in commemoration of its Fiftieth Anniversary.



A White furniture van used during the Company's early days.



One of the Company's modern White tractors coupled up with a new refrigerator van just put into service. Davidson provides complete transportation facilities including: long distance contract hauling and common carrier service with regular, refrigerator and household units.



FOR MORE THAN 45 YEARS THE GREATEST NAME IN TRUCKS

ask **Nutting ENGINEERS**
FOR ADVICE ON
MATERIALS HANDLING

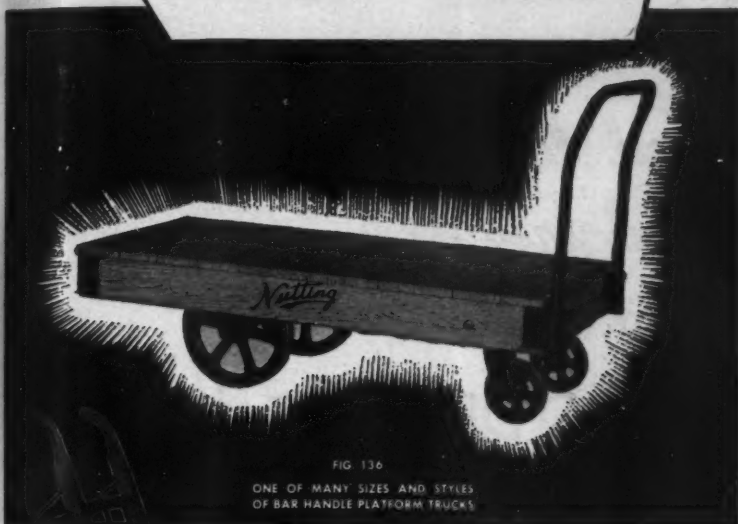


FIG. 136
ONE OF MANY SIZES AND STYLES
OF BAR HANDLE PLATFORM TRUCKS

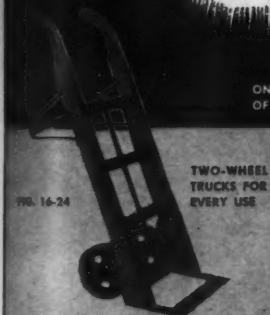


FIG. 16-24

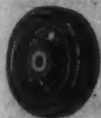
TWO-WHEEL
TRUCKS FOR
EVERY USE



FIG. 419-421 JACK AND LIVE SKID



CASTERS,
ALL TYPES,
LIGHT,
MEDIUM,
HEAVY DUTY



WHEELS WITH
DEMOUNTABLE
RUBBER TIRES



FIG. 100 BARREL TRUCK
Here is a good example of what a specially
designed truck for a specific use can do to
speed up the work and make it easier. Send
for special circular on Fig. 100 Barrel Truck.

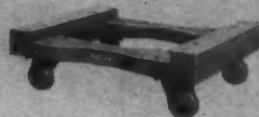


FIG. 138 DOLLY
A heavy hardwood frame dolly for boxes,
crates, etc. Double ball race swivel casters
with metal or rubber tired wheels. NUT-
TING makes all types of wood or steel dol-
lies with capacities up to 4000 lbs.

NOW is the time to Engineer *Your Materials Handling*

Your materials handling system needs to be carefully planned and engineered—hit-or-miss methods are slow and wasteful. A planned layout may well be the difference between profit and loss, between smooth-flowing operation and a time-wasting series of bottlenecks. Take advantage of the seasoned experience and valuable advice of a Nutting Engineer. Because the all around adaptability and versatility of Nutting trucks has never been excelled, he can advise you on the proper use of trucks with overhead or floor conveyors . . . interdepartmental use . . . as well as the right type of truck and its correct application for any warehouse, terminal or shipping room use.

Over 1000 Nutting Designs

55 years of specialized, continuous experience in building materials handling equipment is embodied in the Nutting line for your benefit. We supply every need in floor trucks, casters, wheels—including specially designed trucks for specific needs.

LOOK in Your Classified Telephone Directory
to contact your nearest Nutting Sales Engineer, or write to us direct.
Ask for bulletin 46-G.

NUTTING TRUCK & CASTER COMPANY
1166 DIVISION STREET WEST, FARIBAULT, MINNESOTA



Here's how it adds up —

Good roads
Good trucks
Good bodies

GOOD DRIVERS

World's finest highway transportation

After all, it is the man at the steering wheel who makes good roads, good trucks, and good bodies add up to the world's finest system of highway transportation ▲ That is why we keep the man at the wheel constantly in mind when we build Gerstenslager Vans and Truck Bodies ▲ Everything we can do to contribute to his comfort and efficiency helps to strengthen an essential link in the chain of America's industrial performance.

The **GERSTENSLAGER** *Co.*

WOOSTER, OHIO

Established 1860

DESIGNERS AND MANUFACTURERS OF CUSTOM-BUILT VAN AND TRUCK BODIES

For lowest cost
material handling . . . use
Electric power
in . . .



Electric Industrial Trucks

When production costs must be cut and your attention must turn to hitherto neglected wastes in material handling, you will find the answer in mechanization with central station *electric power*—the power that serves industrial processes most dependably, most economically.

In warehousing, in serving common carriers or production processes, you will find that materials flow easily, quickly, safely, and at the lowest cost per ton handled, when the job is assigned to *battery-powered* self-loading industrial trucks.

The Electric Industrial Truck Association

208A South La Salle Street, Chicago 4, Illinois

JULY, 1946



Send

FOR THESE BOOKLETS . . .

Two illustrated booklets—**MATERIAL HANDLING HANDBOOK** and **UNIT LOADS**—may help you detect and correct excessive cost wherever you move or store materials.



NOTHING BUT MACKS FOR 20 YEARS!



J. J. Kelly's All-Mack Fleet is Basis of Efficient Operation in Jacksonville, Fla.

The J. J. Kelly Company of Jacksonville has been a contract carrier for the Great Atlantic & Pacific Tea Company since 1926, using Mack trucks exclusively.

Mr. Kelly personally has broken in every new Mack he has owned. The first one, an AC Bulldog Model bought in 1926, is still in service in

Daytona Beach. Latest addition to the fleet is the Mack LFT shown above, which, Mr. Kelly states, has chalked up the most economical ton-mile record in the fleet.

Macks can boost efficiency, cut operating costs for you, too. Why not talk to your local Mack man about it?

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts.

Mack
TRUCKS
FOR EVERY PURPOSE



*Performance
Counts!*

35 YEARS
PUT **HANDLING EXPERIENCE**
TO WORK FOR YOU

A pioneer in the materials handling field, Mercury has over 35 years in the designing, manufacturing and installation of materials handling equipment. This experience is engineered into every Mercury Tractor, Trailer and Lift Truck.

FORK TRUCKS

Available in the following models:

"JEEP" Sit Down, Center Control Fork Truck: 2000 lbs. capacity. Easily maneuvered in limited areas.
 "YAK" Center Control Fork Truck: 4000 lbs. capacity. Rugged design.
 "YANK" Center Control Fork Truck: 6000 lbs. capacity. Tough continuous service.

ELEVATING PLATFORM TRUCKS

Available in the following models:

"JUNIOR" Models: Low, high and telescopic lift types. 4000 lbs. capacity.
 "SENIOR" Models: Low, high and telescopic lift types. 4000 lbs. capacity.
 "STANDARD" Models: Low, high and telescopic lift types. 6000 lbs. capacity. Sturdy design.
 "MOGUL" Models: Low and high lift types. 10,000 lbs. capacity. Designed for unusually heavy loads.

TRACTORS—TRAILERS

Available in the following models:

"TUG" Electric Tractor: Powerful compact tractor available in twin-wheel and 4-wheel models, medium or heavy duty.
 "BANTY" Gas Tractor: Most compact tractor made, yet develops a draw bar pull in excess of 2000 lbs.
 "HUSKIE" Gas Tractor: A powerful, 6-cylinder, 4-wheel tractor.
 Built to haul any wheeled load it might encounter in industry.
 "SUPER-HUSKIE" Gas Tractor: Dual, rear-wheeled industrial tractor powered with 6-cylinder engine. Built for severe industrial service.
 TRAILERS: Available in castor or 5th wheel steer, platform or side dump types.



MERCURY

THE MERCURY
 MANUFACTURING CO.

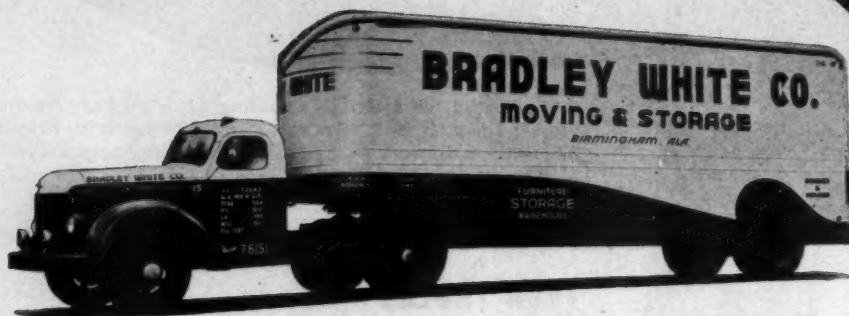
4104 S. Halsted St., Chicago 9, Ill.

TRACTORS—TRAILERS—LIFT TRUCKS

FREE: Mercury
 "Pocket-Catalogue"

For complete data on all Mercury equipment, including the latest additions to Mercury's expanded materials handling line, request Bulletin 251-B.





Buy HERMAN VAN TRAILERS

Get all these advantages...

- **SIZABLE SAVINGS**

The price of a Herman van trailer to you is low because it is a direct "factory-to-you" transaction. No commissions. No middleman's profit . . . no out-of-town overhead to pay for. Dealing direct with Herman gives you Dollar savings—plus other benefits.

- **EXPERIENCED PRODUCTION**

From start to finish, your order is under the personal supervision of a Herman executive, who knows the requirements of the furniture and warehousing industry in addition to the technique of building better bodies. A Herman is RIGHT in every way. It's "INDUSTRY DESIGNED."

- **ALL-STEEL . . . ALL-WELDED**

Years of experience building hundreds of van trailers has taught us how to put the most value into All-Steel . . . All-Welded construction . . . bodies that look better, last longer . . . and operate with lowest maintenance costs. Quality equipment that makes you proud to own a HERMAN.

**DIRECT
FROM OUR
FACTORY
TO
YOU**

**IT'S EASY
TO DEAL
with HERMAN**

Just write to E. C. Simmons at Herman Body Co., St. Louis. He specializes in van trailers exclusively. He will send you photographs, drawings and complete description. Later he will discuss the details with you by phone.

**HERMAN
BODY COMPANY
4400 CLAYTON AVE.
ST. LOUIS 10, MISSOURI**

TWA Announces a NEW DEAL IN AIRFREIGHT



You hold the winning hand when you ship by TWA Airfreight now. Recent improvements in our own service and arrangements with connecting airlines give you more reason than ever to use this fast, frequent service throughout the United States.

First of all, rates are *lower*—and on top of that a *single rate structure* for all commodities eliminates all former rate differentials.

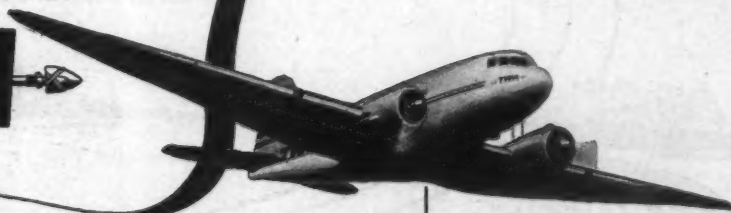
Now, too, *every* TWA flight carries airfreight—including those record-speed, non-stop Constellation flights that *only TWA provides* within the United States.

And finally, interline arrangements with four connecting airlines make it possible to offer direct airfreight service to *82 major cities* on a *single "air bill"* from shipper to consignee.

What more could you ask for? Door-to-door delivery? That's still available, too, to all cities on TWA's own routes. For full details phone your local TWA Airfreight office now.

**Airfreight by
TWA**

**Less Transit Time—
More Sales Time**



Direct one-carrier
air express service to Europe
and the Middle East, as well.



"WINNERS"

are notably endowed with

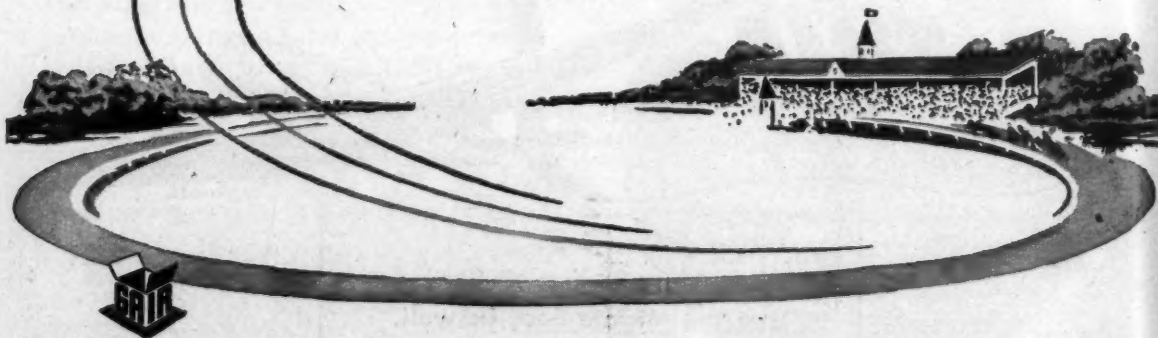
SPEED — PRECISION, AND — PERSONALITY —

says **ROBERT GAIR**

Modern types of packaging machinery are endowed with speed, and personality too... and each machine demands a "uniform precision" carton... just the kind of distinctive "tailor made" cartons that Robert Gair has been creating and producing consistently for over eighty years... cartons that are **GAIRanteed**.

From a "selling impulse" viewpoint many of our cartons have joined the parade of constant WINNERS.

Write for informative brochure on Precision Packaging



ROBERT GAIR COMPANY, INC., NEW YORK—TORONTO • PAPERBOARD—FOLDING CARTONS—SHIPPING CONTAINERS

MORE STACK MORE "JACK"!

... that's more truth than poetry. Space is really put to work in this warehouse—to accommodate goods from floor to ceiling. No needless empty areas which fail to "pay for their keep", eat up profits. Instead, here is a shrewd, dividend-producing operation . . . made possible by the modern Yale High-lift Fork Truck, which picks up and transports great tonnage per day, spots giant pallet loads in compact rows, stacks clear to the ceiling.

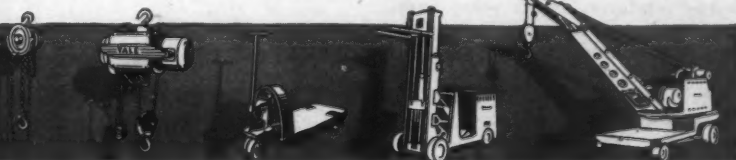
Dollars are "in the air" in your warehouse. Let Yale Fork Trucks reach for them—and you'll corral a handsome jackpot. And remember, with Yale Fork Trucks on the job you speed operations *all along the line*—in receiving, storage, shipping. You save effort; eliminate wasteful rehandling; conserve manpower. You wipe out "muscle money", those extravagant handling costs which pile up whenever muscle power lifts and shifts materials. You profit—cut costs by "mass moving" goods *quickly, economically, safely*.

Get the facts about money-saving Yale Fork Trucks, and other Yale Material Handling Machinery. Phone the nearest representative, or write to us direct. The Yale & Towne Manufacturing Company, 4530 Tacony St., Phila. 24, Pa.



MATERIAL HANDLING MACHINERY

CUTS HANDLING COSTS... SAVES TIME... SAVES EFFORT... PROMOTES SAFETY



HOISTS—HAND AND ELECTRIC • TRUCKS—HAND LIFT AND ELECTRIC • KRON INDUSTRIAL SCALES

EXTRA STRENGTH with LESS WEIGHT!



TRAILMOBILE New Streamlined Tanker has Striking Internal Reinforcement!

Here is a tanker that is lighter, stronger, and the "easiest pulling" in the industry. This means that payloads are increased. Vibration is minimized. Maintenance is reduced. Hauling is faster, easier. And tanker-operation is far more profitable.

We did it by eliminating all the excess weight of "outside" supporting-structures. And then adding special 3-way reinforcement to every baffle, head and the end-sheets; in addition to special bolstering throughout the inside of the tank. So the tank itself supports the load, distributing shocks and stresses throughout "every inch" of the trailer. Every member, even the shell, bears its full share of the load.

Moreover, this tanker has many other advantages. Due to a repositioning

of the sumps and to special costlier elbows, unloading drainage is faster. And overflow drains from the solid catwalk down one ladder-upright. With oval nose, trim skirting, sloping rear, and overall redesign, it's a beauty. See it, at your Trailmobile Branch.

THE TRAILMOBILE COMPANY
Cincinnati 9, Ohio

SPECIAL FEATURES

Tubular axles (demanded 2 to 1).
"Horizontal," rubber-bushed radius rods.
Adjustable upper fifth-wheel plate.
"Fastest" unloading drainage.
"Slam latch" fill-plug domes.
Heavy-duty channel bumper.
Full-length hose-tubes.
Sturdy reinforced bulkheads.
Special safety features, including fuse plugs and safety valves, throughout.
Many others!

ALSO SUPPLIED WITH
TRAILMOBILE'S SIMPLIFIED
TANDEM — WITH ONLY
2 POINTS FOR
LUBRICATION!



Protecting its 105 Year Reputation

— 71 "Homelinks" Service Centers

DISTRIBUTION AGE

Through Passenger Service Designed to Meet INDUSTRY'S NEEDS



Here is a new passenger train service ideal for industrial executives making business trips between the East and West Coasts. This no-extra-fare service is 10 to 18 hours faster than previous service between Chicago-St. Louis and the West Coast terminals.

**Between
NEW YORK-WASHINGTON, D. C.
and LOS ANGELES-SAN FRANCISCO**

From New York . . . through sleeping-cars depart on the New York Central and the Pennsylvania railroads. On arrival at Chicago they are carried through to Los Angeles on the Transcon; to San Francisco on the Overland.

From Washington, D. C. . . . through sleeping-cars departing on the Pennsylvania are carried through from Chicago to Los Angeles on the Transcon—to San Francisco on the Pacific. Departing on the Baltimore and Ohio, sleeping-cars are carried through to San Francisco on the Pacific.

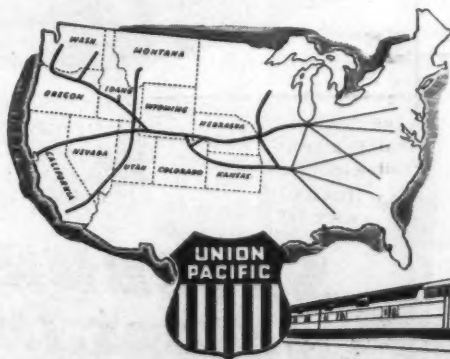
Similar service available eastbound from Los Angeles and San Francisco. No change of cars enroute in either direction.

**Between
ST. LOUIS-KANSAS CITY-DENVER
and PACIFIC COAST**

Departing from St. Louis on the new Streamliner "CITY OF ST. LOUIS" through sleeping-cars are routed to Portland-San Francisco and Los Angeles (via Kansas City-Denver) with no change of cars enroute. Similar service is available eastbound from the West Coast.

For complete information regarding schedules, accommodations and other passenger service to or from the Union Pacific West, inquire at your local ticket office.

TO VACATIONISTS . . . Union Pacific serves more western scenic regions than any other railroad. These include California, Pacific Northwest, Colorado, Yellowstone and the National Parks of Southern Utah-Arizona.



**be Specific -
say "Union Pacific"**



UNION PACIFIC RAILROAD

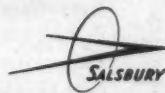
ROAD OF THE Streamliners AND THE Challengers

THE SALSBUURY TURRETEER

More Easily Negotiates Sharp Corners...Tight Spots...Steep Ramps



The Salsbury Turreteer (platform type) is highly maneuverable, powerful, stable and simple to operate. It will carry a 4000 lb. load and operator at speeds up to 7 m.p.h. Saves time in picking up, transporting, and spotting skids. Has 3 in. hydraulic lift.



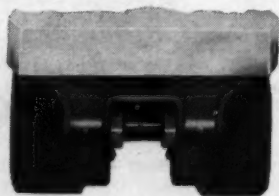
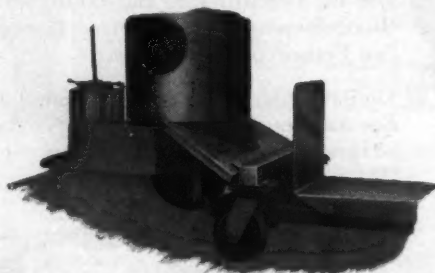
There's power inside the turret



The Salsbury Power Package, with its efficient 6 hp motor, automatic transmission and automatic clutch, is combined with the drive wheel in a single unit. Direction of travel is altered by revolving the turret, giving unusual maneuverability. Requires no batteries, no gear shift, no clutch lever, no reversing lever. Throttle and brake are the only controls.

Articulation insures shock-proof travel

Exclusive Salsbury articulation smoothes out the bumps. Four wheels are under the load at all times.



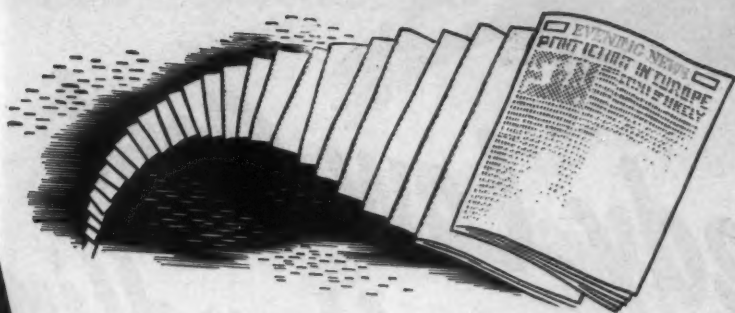
Husky and unusually stable

The Turreteer is equipped with extra wide, heavy, rubber-tired load wheels to insure stability and prevent load dumping.

For more information on Salsbury materials handling equipment, including the Turretug (tractor type), and the Turretuck (cargo type), write for Bulletin 4602-4.

SALSBUURY MOTORS, INC.

1201 Lexington, Pomona, California
A subsidiary of Northrop Aircraft, Inc.



The Newspaper Presses That Are 217 Miles Long

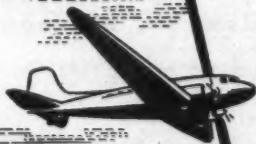
*How ACT puts two New York newspapers into
Washington, D. C. at the same time they are
being delivered to New York City suburbs...*

For all practical purposes, the presses of the New York Times and the New York Herald Tribune run all the way from New York to Washington, D. C. because the breakfast tables of Washington receive their copies of these two great papers at the same time the suburbs of New York are receiving theirs.

Here's how it's done: Each morning late editions of these papers are taken hot off the press, loaded in waiting ACT Sky-Vans, and flown to Washington. There in the grey hours of early morning, the distributor's truck picks them up at the airport for speedy newsstand distribution.

There is no waiting for schedules, because ACT Sky-Vans are charter carriers, providing a completely flexible service that is individually fitted to the individual needs of each client.

So whether you are shipping publications, dresses, seafood, flowers or heavy machinery—it will pay you to investigate the quick personalized service of ACT. Just call or wire for full particulars.



When Time Counts—ACT



AIR CARGO TRANSPORT

CORPORATION • A CHARTER CARRIER
EMPIRE STATE BUILDING, NEW YORK 1, N. Y.

THIS IS THE TRUCK FOR

Speedy Low Cost Handling



Step up your materials handling efficiency and step down your materials handling costs by transporting your loads as a unit. The Crescent Electric PALLETIER picks up, totes, tiers and detiers palletized goods...quickly and economically...safely and easily.

The PALLETIER speeds every operation from receiving to shipping... negotiates a seven-foot car door... stacks material 108 inches above the floor (132 $\frac{1}{4}$ inches with forks inverted)... utilizes more cubic feet of storage space in stock room and warehouse... reduces accidents and damage to merchandise.

The Crescent Electric PALLETIER is the right truck to increase your handling efficiency...reduce your handling costs. Initial price is low. Maintenance expenses are minimum. Send for the PALLETIER bulletin today.



CRESCENT TRUCK COMPANY
1100 Willow St., Lebanon, Pa.

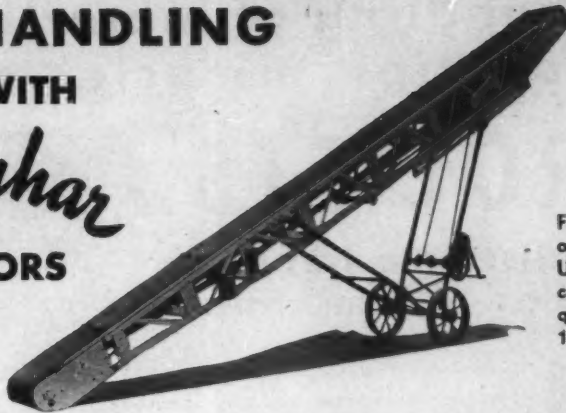
QUICK FACTS

The PALLETIER—result of almost eight years of research—is the ultimate in efficiency. An operator can now spot and tier without straining or stretching. All control levers are on the dash—right at the driver's fingertips. Exceptional stability is provided by the location of the hydraulic tilting cylinder. Carriage tilts backward 15 degrees and forward 5 degrees. Protection against forced acceleration is provided by full magnetic controls—an outstanding and exclusive PALLETIER feature. Ready access to all mechanisms facilitates replacements, inspections and adjustments.

CRESCENT
Electric **PALLETIER**

SPEED HANDLING WITH

Farquhar
CONVEYORS



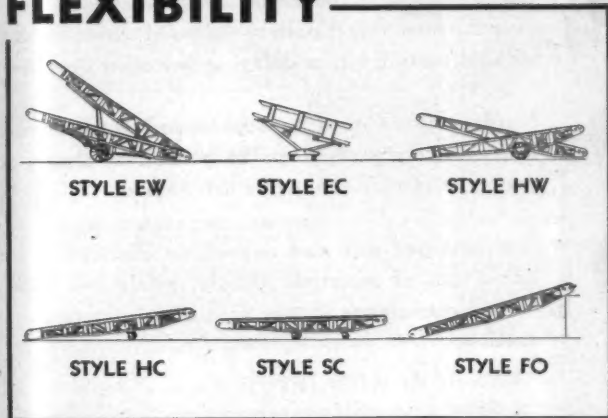
MODEL 391

Four standard sizes all easily moved by one man: 14', 17', 20', and 23' long. Used singly or in tandem, to elevate or carry horizontally. Elevating models require 2 h. p. motor... horizontal models, 1 h. p. motor.

FEATHERWEIGHT FREIGHT CONVEYOR

FOR
BAGS, BOXES, CASES
CARTONS, CRATES, HAMPERS, ETC.

FLEXIBILITY



All mountings are easily interchanged.

STYLE EW—Elevating Wheel Truck for stacking, loading and as a booster for gravity conveyors. Wheels provide the easiest portability on rough surfaces.

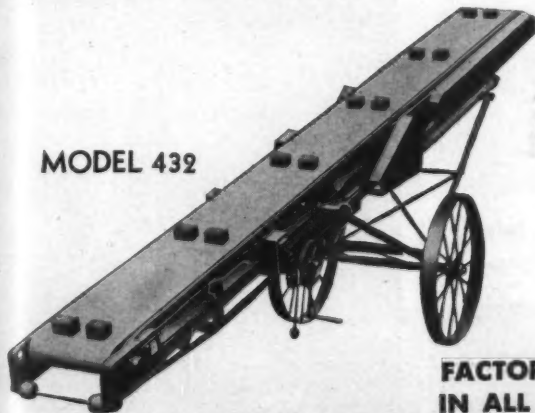
STYLE EC—Elevating Caster Truck provides convenience in sidewise movement.

STYLE HW—Wheel Mounting for horizontal conveying or carrying to slight elevations.

STYLE HC—Two Caster Mounting for horizontal conveying or slight elevation.

STYLE SC—Four Caster Mounting for horizontal conveying only.

STYLE FO—Frame Only for permanent installation, carrying from floor to floor, between buildings, etc.



MODEL 432

PORTA HEAVY DUTY FREIGHT CONVEYOR

MADE IN standard widths of 18", 24", 30" and 36" and lengths from 17' to 50'—for horizontal, elevating or stationary installation. Write for Bulletin 432.

FACTORY TRAINED REPRESENTATIVES
IN ALL PRINCIPAL CITIES

1856

NINETIETH ANNIVERSARY YEAR
A. B. FARQUHAR COMPANY

1946

203 Duke Street, York, Pa.

Branch Office: 614 West Elm Street, Chicago, Illinois

**fast, easy handling of materials helps
make production miracles possible**

ELECTROLIFTS

**cut time and distance between
plant operations to a minimum**



For serving a lathe, the operator handles a Monorail ElectroLift with Push Button Control.

Picture an express highway speeding traffic over congested areas and you have the idea of how ElectroLifts streamline plant production.

Built to operate with unusually close headroom, ElectroLifts take up no valuable space themselves, provide all of these advantages:

SAVE TIME

Up to six tons of materials can be moved at once, over the most direct path to the point where needed, without waiting for, or delaying any other operation.

SAVE SPACE

No floor space need be kept open for the flow of materials, equipment can be packed in closer, no depots at machines must be maintained.

RELEASE MAN-POWER

One unskilled man can operate an ElectroLift and move tons of materials quickly, safely and easily. Skilled man-power is thus kept busy on actual production.

Engineering Service — Because of the variety of speeds, capacities and hoists available to meet the most specialized industrial handling requirements, it will pay you to consult ElectroLift Engineers for the type of ElectroLift best suited to your particular needs. Call on this service any time.

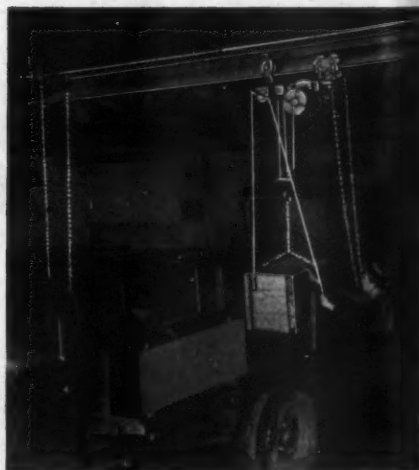
Features of ElectroLifts that make them Outstanding in Production Work

Exclusive Worm Drive Mechanism . . . makes ElectroLifts quieter in operation, longer lasting, more compact and efficient.

Totally Enclosed Motor . . . designed especially for hoisting service.

Large Diameter Drum . . . grooved to prevent cable overlapping.

Choice of Controls . . . cord or push button control, remote control or completely automatic control may be had as desired.



Truck loading is easier with a Monorail Rope Control ElectroLift.

ELECTROLIFT, INC.



30 Church Street, New York 7, N. Y.

SERVING YOU THROUGH SCIENCE

U.S. ROYAL LOGGER
for timber hauling

U.S. ROYALS

*Engineered
for the job!*

**U. S. ROYAL
ROAD GRADER**
for road work

**U. S. ROYAL
EARTH MOVER**
for carryalls

U. S. ROYAL CON-TRAK-TOR
for construction and mining

U.S. ROYAL FLEETWAY
for the highway

**U.S.
ROYAL
TIRES**

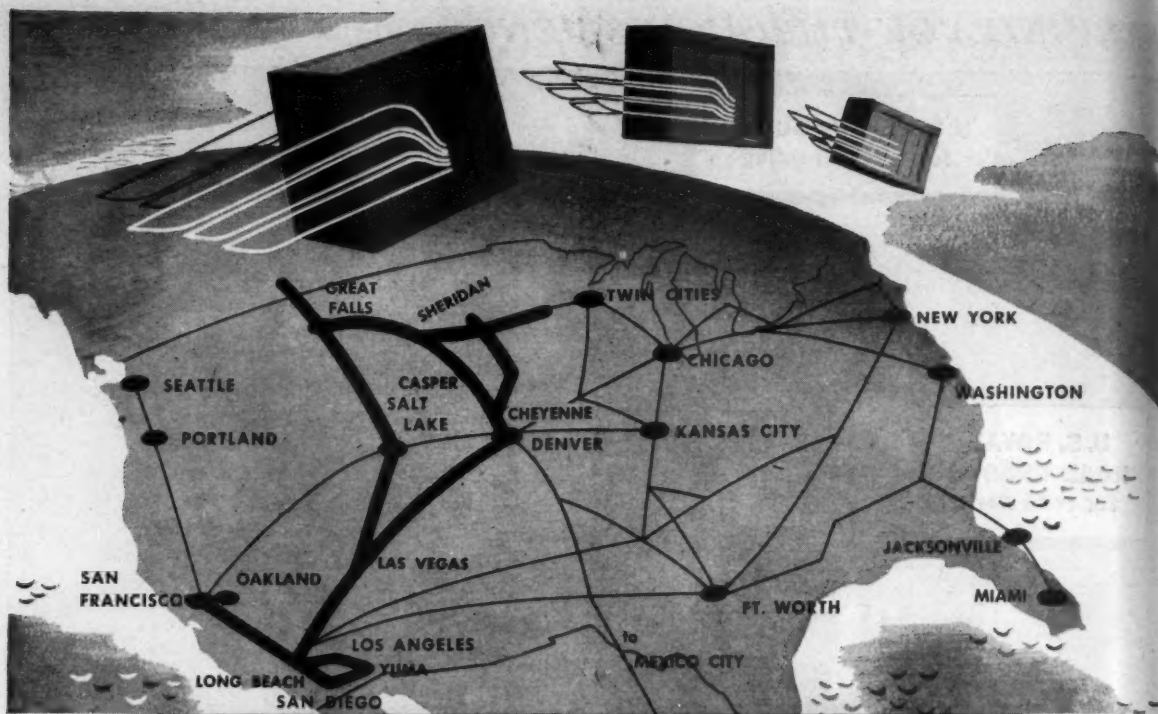
UNITED STATES RUBBER COMPANY

1230 AVENUE OF THE AMERICAS

ROCKEFELLER CENTER

NEW YORK 20, N. Y.

JULY, 1946



NOW! *Systemwide* **AIR FREIGHT SERVICE**

Western Air Lines offers Air Freight service over its *entire system*...service shrinking shipping time for all commodities whose profitable marketing depends on speed. In conjunction with other carriers, shipment can be made anywhere in the U.S.A. New rates offer shippers economical, speedy transportation. Pick-up and delivery service optional at small added cost. Ship anywhere by Western Air.

AN ADDED SERVICE

It costs you nothing to find out how Air Freight fits into your shipping picture. Western Air Lines Air Cargo Engineers (ACEs) are ready to analyze your distribution problems...to show you the advantages of this modern method of shipping and recommend its use *only* if it is advantageous to *you*. For complete information on air freight, air express or air mail, write Cargo Traffic Department, 510 W. 6th Street, Los Angeles 14.


WESTERN *Air Freight*

PUTS WINGS
ON WEIGHT

WESTERN AIR LINES

1926 • AMERICA'S PIONEER AIRLINE • 1946

BUILT FOR *Your* BUSINESS



Whatever your hauling requirements, GMC's wide range of models from $\frac{1}{4}$ to 20 tons offers you the exact kind of trucks you need for your job. Postwar GMC tractors, pick-ups, stakes and platforms are the best GMCs ever built. They have engines of the same basic design as the famous GMC-built "Army Workhorse." They boast heavier frames and axles, sturdier clutches and transmissions and bigger brakes, plus such prewar GMC advantages as Turbo-Top Pistons and Recirculating Ball-Bearing Steering. GMCs are all-truck built. They're built for your business.

GMC
TRUCKS

The Truck of Value

GASOLINE • DIESEL

GMC TRUCK & COACH DIVISION • GENERAL MOTORS

PICK A NUMBER—



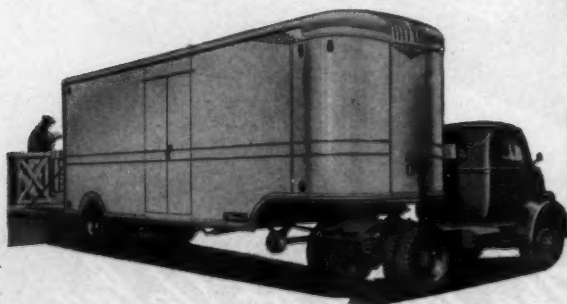
Every One PAYS OFF!

YOUR FRUEHAUF TRAILER is a highly-developed, scientifically engineered product. These highlighted features explain in part why Fruehauf Trailers continue to pay dividends for thousands of miles beyond normally expected service. Check each feature.

8 Factories—60 Factory Service Branches

FRUEHAUF TRAILER COMPANY • DETROIT 32

World's Largest Builders of Truck-Trailers



Latest advancements in Trailer engineering are reflected in Fruehauf's 1946 Furniture Vans. Many refinements—features of vital interest to men in the moving business—have been added.

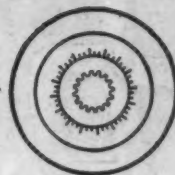
- 1 PROTECTED ROOF CAP**—metal reinforcing strip protects roof cap.
- 2 BRAKE AND LIGHT CONNECTIONS**—elevated to safe position above rub-rail.
- 3 UNSTRESSED PANELS**—serve only as covering. Should they be damaged or removed, the body is not weakened.
- 4 DOME LIGHTS**—illuminate interior. Convenient switch location.
- 5 SIDE-DOOR OPENING**—designed into—not merely cut out of the structure.
- 6 SMOOTH CORRUGATED METAL SLATS**—no protruding surfaces to nick cargo.
- 7 TOOL BOX**—tools accessible without disturbing load.
- 8 HARDWOOD FLOORING**—tongue-and-groove over the galvanized metal.
- 9 GALVANIZED METAL SUB-FLOOR**—extends completely under Trailer. Perfect seal against dirt and moisture.
- 10 INTEGRAL-FRAME CONSTRUCTION**—chassis and body framing are one. Less dead weight—more rigid structure.
- 11 WINCH-TYPE TIRE CARRIER**—designed for one-man operation.
- 12 RECESSED CLEATS**—rope cleats are recessed flush with lining, anchored to steel uprights.
- 13 RUG STRAPS**—are securely anchored to top rail and bows along both sides.
- 14 DOORS**—completely sealed against dust.
- 15 TAIL-GATE**—extra large for convenience in loading and unloading—flush with floor.



FRUEHAUF Trailers

"Engineered Transportation"

EDITORIALS



Palletized Shipments

CERTAIN very definite things are needed before we can hope to have better distribution of materials and products by means of palletized unit loads.

Publicity given to the fork-truck-pallet system of handling wartime shipments by the armed forces has tended to create an illusion that palletized unit loads constitute the final answer to most handling, shipping and storage problems. Such, unfortunately, is not the case. A number of materials and products do not lend themselves to palletization economically. Many others, however, do. But even with respect to these there are serious obstacles to be overcome before palletized shipments can move freely, efficiently and economically.

Confining our remarks to this aspect of the matter, we submit that until there is closer coordination among shippers, carriers, warehousemen and receivers with respect to palletized shipments the advantages of that method will not be realized to the extent that they can and should be.

In the first place, shippers alone cannot adopt palletized shipments successfully without the carriers' cooperation. Present commodity freight rates imposed upon pallets by the railroads are a cost handicap. Pallets should be treated by the railroads as dunnage. Moreover, rail freight charges on empty pallets are excessive, and a serious deterrent to the development of palletized shipments, which the railroads should be anxious to encourage, as unit loads tend to increase volume shipments, to reduce loss and damage claims and to expedite loading and unloading of cars.

In the trucking field there is much to be done before unit loads can be moved freely. The body size and floor load capacity of many commercial vehicles is inadequate for large palletized shipments. More trucks and trailers should be designed so mechanical handling equipment may be used on them for loading and unloading. Lack of uniform state laws regulating the size and weight of commercial vehicles is an additional difficulty.

Another thing needed is modernization of warehouses and terminals for better mechanical handling operations. At the moment, construction costs and regulations make this prohibitive. Still another need that will have to be considered in the future is standardization and simplification of pal-

let sizes. At present, however, pallet development, both with respect to sizes and materials, is in too much of an experimental stage to attempt anything practical in the way of standardization. Finally, receivers of palletized shipments must have the necessary equipment and facilities to handle unit loads efficiently and economically. As Matthew W. Potts, one of the pioneers in the development of palletized unit loads, says, elsewhere in this issue, "When inaugurating unit load shipments, large producers should survey their customers and find out what warehouses, transportation companies and receivers are able to handle unit loads advantageously . . ." To ship unit loads to firms unable to handle them increases costs and decreases good will.

Conversation Piece

THE young man crushed out his cigarette and spoke vehemently.

"There's no freedom of thought," he said. "Opinions and tastes are shaped by propaganda, by advertising, by the example of business men."

"The majority of people accept views they find ready-made," the older man agreed.

"Then why hold out for intellectual freedom? It's a myth."

"To deprecate the value of intellectual freedom because it will never mean the same thing for everybody is to misunderstand completely the very thing that gives intellectual freedom its value."

"What?"

"The free interchange of ideas among individuals possessing different knowledge and views. That is the life process of thought."

"Its development cannot be predicted. We cannot know which views will assist its growth and which will not—"

"Rational thought requires rational discipline," the young man interrupted.

"I agree with you, my friend, but not in the sense you mean. The tragedy of collectivist thought is that, while it starts out to make reason supreme, it ends by destroying reason because it misconceives the process on which the growth of reason depends . . ."

Charles Dornes
EDITOR

DISTRIBUTION DIGEST

... men ... markets ... products ... previews

MEN...The application of the 50 percent rule in the motor carrier industry, affecting the payment of overtime under provisions of the Fair Labor Standards Act to certain employes in respect to whom the ICC has power to establish qualifications and maximum hours of service, has been clarified in an address by L. Metcalfe Walling, Administrator, Wage and Hour and Public Contracts Div., U. S. Dept. Of Labor, made before the 13th annual meeting of the Pennsylvania Motor Truck Assn. on June 7. Because of widespread confusion and misinterpretation of the regulations, operators may find Mr. Walling's exposition helpful.

- J. L. S. Snead, Jr., Consolidated Freightways, Portland, Ore., believes in more truck-trailer standardization. "Why," he asks, "should a truck axle have wheel bearings, oil seals, brake drums and shoes, shoe springs or cam bearings different from those on a trailer designed to carry the same load?"

- S. P. O'Connor, Fellow of the Royal Economic Society, commercial counsellor for distribution and marketing and honorary director, Institute of Distribution, London, mentioned on this page in our March issue, is now in this country on a mission to arrange bilateral trade agreements between British and American companies. Unfortunately, Mr. O'Connor has run into the same trouble many salesmen and executives have experienced, namely, time limitations imposed on guests by hotel managements. Consequently, Mr. O'Connor's itinerary is uncertain and difficult.

MARKETS...Present marketing conditions in most industries and mercantile trades reflect the loss in production caused by strikes. In addition, OPA price restrictions continue to force many manufacturers to curtail production on unprofitable lines. Many firms are unable to operate normally because they cannot obtain parts needed to complete fabricating processes. Their suppliers have been affected by labor trouble, or cannot proceed with orders for lack of parts, or find it impossible to continue operations at a loss. The effect is paralyzing reconversion. Every phase of distribution is being affected also.

NEW PRODUCTS...Nylon cloth, .020 in. thick, is now going to be used in the manufacture of aircraft fuel tanks because of its ability to reduce weight and thus increase payload and range. Its first application in this field will be in connection with the Boeing Stratocruiser airliners with a resultant saving in weight of approximately 3,700 lbs. over the rubber type used in the stratocruiser's military counterpart, the B-29 bomber.

- A new kind of self-adhering labels, called hygrolabels, to indicate by a color change the presence of unwanted moisture are now available for industrial use. The labels are said to have wide application: they can be used to indicate moisture in rooms and containers; in products such as powders, cereals, cotton, paper and tobacco; and to show the leakproofness of glass, cellophane, waxed or other sealed packages.

PREVIEWS...A comprehensive and authoritative reference work on commodity storage is being made by the Refrigeration Research Foundation, under the direction of Dr. M. E. Pennington, chairman of a committee made up of members of the Scientific Advisory Council.

- The recent move on the part of marine insurance underwriters to limit coverage and increase rates to the Philippines emphasizes the need for drastic action to combat the worldwide wave of theft and pilferage arising largely from poor packing methods on the part of many small shippers...A move in the right direction is the development of unit load containers for l. c l. shipments of the type described by Leatham D. Smith, L.D. Smith Shipbuilding Co., in the April issue of this publication.

- The use of army methods in industrial personnel selection are to be applied, it is said, for the first time in the refrigeration industry by Perfecold, Inc. The program is to be in charge of William E. Walton, A.M., Ph. D., formerly Test and Coordinating Officer at the Santa Ana Army Base and Chief of the Psychological Unit at Amarillo—D.J.W.

Give us the Green Light—
**HERE COMES
 YOUR CAR!**

**YOU'LL
 GET IT
 SOONER**
*If it comes
 by Truck!*

You Get Everything You Want and Need—Faster—by Motor Freight!

The race is on—to get scarce goods into consumer's hands. No wonder smarter manufacturers and retailers are saving valuable time by specifying "SHIP BY TRUCK!"

Truck transport is faster. Goods are loaded right at the factory—go direct to wholesaler or retail store.

Trucks offer greater flexibility. They come direct to your door... go direct to the point of delivery... no matter where it is!

There's less handling, too. Less crating. Less breakage. Less loss.

Both manufacturers and retailers can carry less inventory, need less storage space... due to faster, more frequent deliveries. You get greater over-all economy than with any other transportation system!

To see what modern truck transport can do for you, make your own investigation... or write to your State Trucking Association... affiliated with ATA.

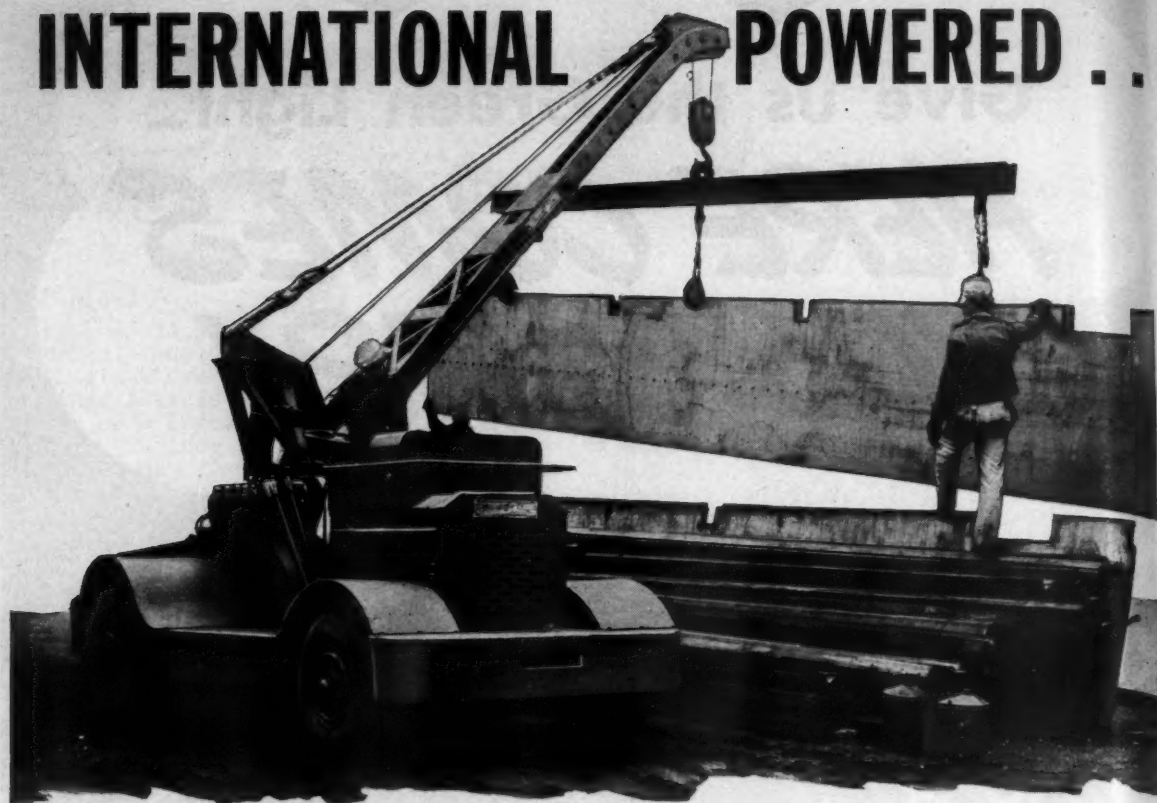


THE **AMERICAN TRUCKING** INDUSTRY

AMERICAN TRUCKING ASSOCIATIONS, WASHINGTON, D. C.

SHIP BY TRUCK—GET THINGS FASTER!

INTERNATIONAL POWERED . .



Labor Saver!

Here is an International Tractor operated revolving crane that proved its worth during the war and now is speeding materials-handling in shops and on construction locations.

Powered by an International I-9 Wheel Tractor, this mobile crane can pick up and move loads as heavy as 15,000 pounds.

In the illustration it is moving a steel floor plate 38 feet long and 40 inches wide from a stock pile to an assembling location where all-metal freight cars are built. This bulky plate weighs 800 pounds and is handled by automatic clamps hung from the "I" beam.

There are many makes of cranes designed for use with International Tractors, crawler as well as

wheel types. Some are tractor-mounted. Others, as in this case, use the basic tractor as power.

We suggest that you check with the International Industrial Power Distributor near you—or distributors of International-powered equipment—on the cranes and other International-powered materials-handling machines now available.

It will pay you to insist on International power when you buy. International engineering and design is your assurance of satisfactory and long-lived performance.

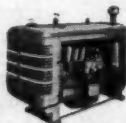
Industrial Power Division

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue • Chicago 1, Illinois

TRACTRACTORS



POWER UNITS



WHEEL TRACTORS



INTERNATIONAL



Industrial Power



Handling Prospects

THE year 1946, so far, has shown manufacturers of materials handling equipment that they by no means have met the peak of production for the types of equipment they manufacture. Even though the armed forces purchased millions of dollars worth of this equipment, comparatively little of it has been declared surplus and placed on the domestic market.

A year ago, it was felt that the end of the war would find us with a surplus of manpower or at least sufficient manpower to meet our production demands. However, the backlog of orders which was built up during the war for consumer goods as well as industrial products has turned out to be much greater than was anticipated. Even though we have had serious industrial shutdowns caused by labor troubles, it is felt that even if the men had worked every day we still could not have supplied the demand.

For this reason, industrialists, warehousemen, stevedores, railroad executives, and distributors are planning mechanization of handling operations, in order to reduce costs and to expedite the production and distribution of goods from raw materials to finished product.

At present, the government is offering for sale as surplus materials handling equipment, a wide

Without mechanical handling equipment we could not have supplied our armed forces during the war. It will take even more mechanical handling equipment to bring about better distribution of goods to meet our larger domestic needs and the growing demands of foreign markets.

By MATTHEW W. POTTS

Materials Handling Consultant

variety of items which are mentioned in another article in this issue. The value is stated as \$60,000,000. It covers a wide variety of units for use within industrial plants, aboard ship, in warehouses, on production lines, etc., and at first glance, seems to be a tremendous amount of equipment to be absorbed in the reconversion of industry, without affecting the production of new equipment.

Demand

In the January issue of this paper, the writer stated that materials handling is a "hundred million dollar industry." A government surplus of \$60,000,000 worth of materials handling equipment should be absorbed quickly in the reconversion of industry, without seriously affecting the manufacture of new equipment.

There is an increased demand for all types of materials handling equipment, and this demand has

been so heavy that the manufacturers of conveyors of all types of industrial trucks, fork trucks, monorail systems, electric hoists, cranes, lift trucks, etc. are quoting deliveries anywhere from 60 days to six months, and in some instances, will not promise delivery of new machines until well into 1947.

No one type of equipment is in a more favored position than another, the reason being that materials handling is now an integral part of our economy, and is required at many stages of production, in the handling of raw materials, in receiving and storing in various production operations for loading and unloading freight cars, tractor trailers, ships and planes, and in the packing and shipping departments of practically every industry.

The war created a number of new manufacturers of materials

(Continued on page 69)



There's \$60,000,000 Handling

OVER \$60,000,000 worth of materials handling equipment is now available as surplus for disposal by the War Assets Administration. The value is fixed at original acquisition prices. Most of the equipment brings in disposal sales from 65 percent to 75 percent of the original cost to government. Broadly, everything that is sold under supervision of the Materials Handling Equipment Branch of WAA, brings to the U. S. Treasury well over 50 percent of the first cost to the government. This is notable, because the average surplus property is regarded as bringing good prices when it is sold for 30 percent of the original cost. As is well known, much surplus is sold for only a fraction of the inventory value.

Materials handling equipment for the most part is in good condition. Little has so far been offered that is over three or four years old. Practically all the equipment sold up to this time originated in

this country, and has never left the United States. The bulk is industrial equipment, and is scattered widely around the country, located wherever there has been industrial production for war.

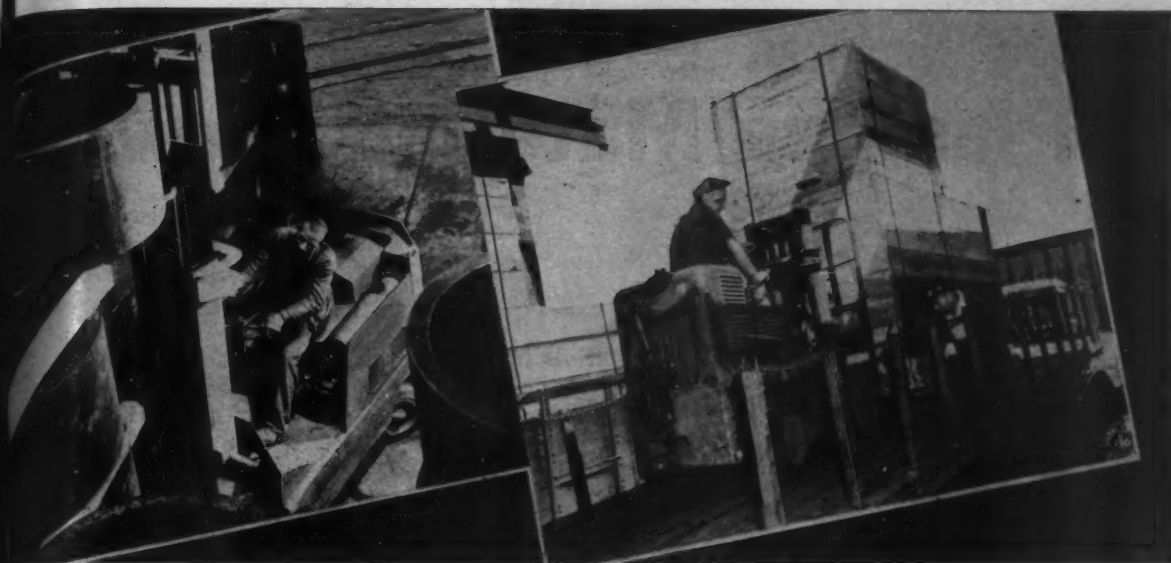
Most of the equipment has been declared surplus by the army. It is estimated 60 percent will come from army, 20 percent from navy, and 20 percent from U. S. Maritime Administration and other sources lumped in this bracket. The rough estimate is that \$12,000,000 worth of the equipment was sold when first gradually re-

leased. Its appearance as surplus has been relatively slow. At the end of last October the aggregate had a total value of \$7,000,000. By February of this year an additional volume swelling the total to \$35,000,000, was declared.

It has not yet been possible to make even an approximation of how much materials handling equipment may ultimately be declared surplus. Apparently a substantial amount is still in use in industrial plants which still are doing some work for the government that is properly classified

By ARNOLD KRUCKMAN

Washington Correspondent



Worth of Surplus Equipment

It is available for disposal by the War Assets Administration through 33 regional offices by negotiated sales. Catalogs may be obtained by those eligible to buy. Most of the equipment is reported to be in good working condition.

as war work. It has not been possible to determine with any exactness how much may be expected from ship building and maintenance units on the Atlantic Coast, the Gulf area, and the Pacific Coast. Nor are there any clear figures to tell what may be expected from overseas. For example, over 125 ships loaded with surplus army items were enroute from various parts of the world, and will unload during May and June. The cargoes are known to include considerable materials handling equipment among the

large amounts of construction machinery. More shipments are expected in July, and during the following months. Little is known about the condition of these consignments.

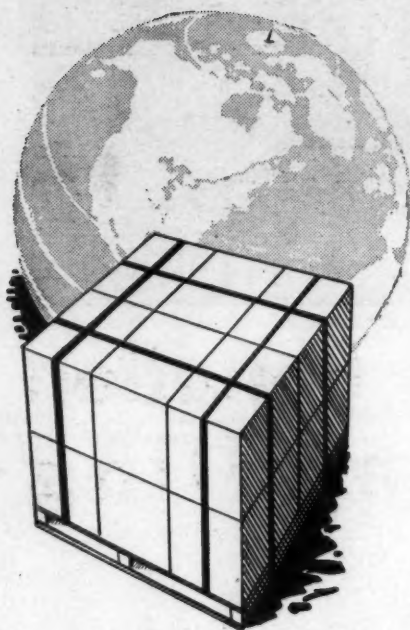
Navy has already brought 22 shiploads back, mostly from the Pacific, the bulk of which was landed recently at Pacific Coast ports. These ships brought cargoes estimated at 25,000 measurement tons. A measurement ton is defined as 40 cu. ft., two measurement tons being approximately one long ton. In addition, there are now en-

route to this country, from navy sources, 73 ships collectively carrying 56,000 measurement tons of equipment and machinery. In May the navy calculated 40 more shiploads for current arrival, another 40 shiploads for arrival in June, and 25 shiploads in July, as well as 10 shiploads in August and another 10 shiploads in September. Both navy and army cargoes chiefly are unloaded at Pacific Coast ports.

The surplus brought back includes tractors, crawler cranes, trucks, jeeps, and many borderline implements, of which a large number are expected to be classified as set-aside preference surplus which goes first to veterans over and above all other claimants, not excepting the federal government. Under a recently validated law, veterans have priority before federal government and all other agencies and classes for those things which are short in supply, and which apparently will

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Planning Materials Flow



Materials handling and the scientific planning of the flow of materials has become a new profession. With ever rising costs of materials and labor, here is a field of cost reduction that has been neglected. Properly used, it can bring about greater distribution at lower cost.

By K. W. FRASE

Project Engineer
Lindsley & Voss
Chicago

DURING the past decade great strides have been made in the refinement of materials, process, design, machine efficiencies, etc., from which industry has enjoyed better products, at lower costs, for greater distribution. For example, the brains of the world have burned midnight oil so as to design machines which would turn out just one more piece part per minute, only to consume these savings by the lack of consideration for materials handling.

In many ultra efficient plants throughout this country examination of the steps of materials handling reveals the startling information that these elements represent as much as 30 percent of the costs.

The U. S. Naval Ordnance Materials Handling Laboratory has stated: 1. The flow of materials through manufacturing plants ac-

counts for 22 percent of industry's payroll. It is the largest single labor cost inside a plant. 2. Products handling operations consumes 60 percent to 70 percent of production time. Actual production takes only 30 to 40 percent of total production time. 3. Skilled labor adds value to the product, unskilled labor adds only to the cost.

With ever rising costs of materials and labor here is a neglected field of cost reduction that can help us have greater distribution at lower cost.

Planning

Materials handling and the scientific planning of the flow of materials has become a profession. In the past, big business and production was under the direct control of the president or general manager. He was compelled to be an expert in financing, sales, purchasing, production, etc. In other words, he was the works. But, as big business became bigger business these various duties had to be

delegated to individuals who were made responsible for the efficiency of their respective departments.

Review in your mind's eye your organization chart: general manager, comptroller, sales manager, production manager, purchasing manager, traffic manager. Are you lacking a materials handling manager? Does this full time job, representing up to 30 percent of your costs, just tag along with the duties of one of the other departments?

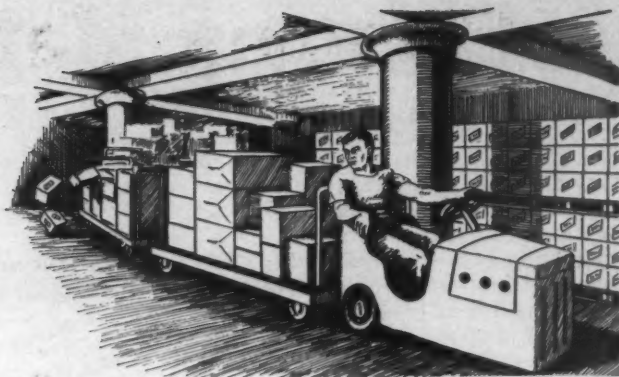
During World War II with its limitations and controls on materials, man-power, storage space, etc., many types of operations were helped by the use of mechanical materials handling equipment such as conveyors, chutes, cranes, hoists, mon-o-rails, etc., and by the use of fork trucks and pallets.

A survey of materials flow for a national distributor recently revealed that the cycle of operations represented 10 piece-by-piece hand loadings and unloadings from receiving dock to shipping platform at a terrific cost. By the unit-load method this was reduced to five operations at a four-to-one cost ratio.

(Continued on page 101)

This is part of a paper read by Mr. Frase at the Chicago Production Show and Conference sponsored by the Chicago Technical Societies Council.

Negligence with, or misuse of, powered handling equipment looms as one of the major sources of container mortality. Shipping containers and their contents cannot "take it" when the full power and strength of modern handling equipment is misdirected. However, there are ways to multiply the efficiency of personnel manning materials handling equipment.



The Human Equation In Handling

By CHARLES L. SAPERSTEIN

General Manager
Glean's Assortments, Inc.
New York

Formerly Packing Control Officer
Army Air Forces

MOST manufacturers of materials handling equipment, whether fork trucks, tractors and trailers, cranes, hoists, conveyors, stackers or other power equipment, pride themselves in their product's ability to "take it." That is understandable. For handling operations demand rugged and dependable equipment.

However, there is another side of the story. From the standpoint of one who has repaired thousands of containers found damaged in transit from handling, at points of origin or destination, negligence with, or misuse of, powered handling equipment looms as one of the major sources of container mortality. Unfortunately, shipping containers and their contents cannot "take it" when the full power and strength of modern handling equipment is misdirected.

While it is true accidents and

carelessness may never be entirely eliminated, ways and means have been evolved to multiply the efficiency of personnel manning materials handling equipment. As with all good things which have increased man's physical capacity, checks and safeguards must be introduced to prevent handling equipment from becoming a source of destruction.

Safety

Originally, the railroads depended entirely upon physical capacity of engineer and pedestrian to prevent tragedy. Gradually, guarded grade crossings, fenced in right-of-ways and automatic safety signal systems were introduced to supplement the human element. Electric elevators solved the problem of transportation between various levels in multi-storied buildings. But until safety doors and other devices were introduced, there was a long, sordid story of loss of life and limb through slips in the operators' performance.

Materials handling equipment

today is still in the stage of the hazardous railroad crossing or the elevator which can move with doors ajar. The accidents which occur, of course, are to the containers being handled more often than to persons. Because of this, and also, because the "accident" usually is known to and observed by the operator of the equipment only, the damaged, punctured or crushed case is too often surreptitiously left in the load, unreported.

The problem can be solved. But it cannot be solved in an atmosphere of collusion on the part of those in authority who, not wanting "to borrow trouble," take no steps to report or inspect the internal condition of mishandled containers. To illustrate, a fork truck operator is moving a pallet-load of packaged goods. One item works itself off the top as he is racing along and falls some four or five feet. There is no outward sign of damage. The condition of the contents however, is unknown. If the foreman, even though he admonishes the operator to be

more careful, permits the fallen container to be placed back on the load and it goes on as if nothing had happened, then he can blame only himself if all the freight handlers fall into the practice of ignoring the consequences of mishaps to cargo.

All materials handling equipment has one thing in common. They multiply the power of man's hands. When carelessness, accident or lack of familiarity with the equipment by an individual worker changes this power from one of orderly movement or arrangement to one of destruction, the chances of damage are multiplied. A quick, fleeting slip and a powerful fork truck can run its prongs through a case or crush the timber and sheer the nails from the bottom. A tractor makes too fast or too sharp a turn and cargo is catapulted from the trailers. A crane operator stations himself a bit too far from the load being lifted and an unexpected swing results in a damaging collision.

In considering how to reduce such damage and to build an enviable safe performance record for the powered tools of cargo handling, two sides of the responsibility must be considered. Always the greatest responsibility rests with the man operating the equipment, and that we shall consider first. However, there is the responsibility of management also, which directly affects the results of the operator, and that will be touched upon later.

Training. Skill in operating is not something picked up vicariously. Before a man is put on a machine he should be subjected to as critical a check up as any one applying for a heavy-duty chauffeur's license. Because certain equipment develops its own idiosyncrasies and because there are differences in response in equipment of different makes, prior experience is not always proof of an operator's ability to handle the machine he is expected to man. For the same reason, the less switching around of equipment between operators the less mishaps will result until the men become adjusted to mechanical differences. Incidentally, the less switching of machines assigned to operators, the

Modern Packing



A 600 lb. transmission is lowered by hydraulic hoist to wirebound crate base and bolted fast. Cross pieces on base are spaced so that different model transmissions can be shipped in the same crate.

more pride will be developed in maintenance and care of equipment. Manufacturers of some equipment will assist in the training of operators. When this is not feasible, any man not showing maximum skill should be instructed by the most skillful operator for improvement in operating technique.

Policing. Because we are contending with human nature it would be expecting men to report against themselves to volunteer information on a mishap that can be covered up, at least, temporarily. In most large operations, therefore, it is well for the operators to know that their work is being watched and records maintained of their accomplishments. This should be a positive, rather than a negative, approach. That is, its objective should be to find and reward efficient materials handling.

Reporting. This can be made one of the most effective safeguards of all, against destructive handling of cargo. The plan is this. Any sizeable warehouse, depot, terminal or pier operation employing a number of operators of equipment, should insist upon any container showing appearance

of outward damage, mismarking or inner insecurity being reported in the manner customary to that operation. It may be to the freight inspector, claims department or cooperator employed for such case discrepancies. The container either should be held aside in a designated area or, if it must remain with its lot of cargo, either a copy of the damaged report or a special card should be affixed.

The reporting system permits this rule: "Any broken case not reported upon arrival will be presumed to have been damaged by the individual or crew working that area." This does two things. It puts all men on their toes to report any evidence of damage upon arrival of cargo. It brings home to the materials handling operator that he cannot escape responsibility for negligence, even if he doesn't report his accident. Without the reporting system, it is easy enough for the operator to say, "that is the way the case reached me." Where the receiving platform is required to report or segregate broken cases, I have seen equipment operators refuse to lift or tow cargo visibly damaged until satisfied the report had been made.

Pallet Dating. This is another and simple safeguard against reckless handling of equipment, especially in connection with pallet loads. Pallets are continually wearing out and require rebuilding or repairing. Nothing destroys them however, as much as a careless fork truck operator. By stenciling new pallets when introduced into service, and a later date each time the pallet is repaired, makes it possible to put a finger on a careless or inefficient operator. If pallets picked up for repair in one terminal section show they have had a life of only three or four weeks where the average for normal operation is four to six months, then there is an automatic check on a potentially hazardous operator.

Management's Responsibility. There are some instances of case mortality from materials handling equipment where the blame rightfully goes higher than the operator. It may be the result of instructions

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Many plant operators do not know and do not fully appreciate that the handling of materials in a plant eats up from 25 percent to 40 percent of production costs. The present cost accounting systems of most companies do not give an accurate cost breakdown of handling operations.

Mechanical Handling And Costs

IT IS often asked, "Do you see any noticeable difference in materials handling practices today compared with the years before the war?" That is one of the most frequently voiced questions these days among those interested in the efficient movement of the products of industry.

The answer is not easy, but it can be said with confidence that there is a definite trend toward improvement. You need not go far in looking into different plants to learn why this is so. Materials handling is growing up. But it is only by "fits" and "starts". If you could hinge back the roof of one plant you would see "picking up" and "setting down" opera-



By ROBERT J. MCGREEVY

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Yale and Towne Mfg. Co.
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Formerly Lt., Materials Handling Section
Bureau of Supplies and Accounts
United States Navy

tions, materials handling, being conducted not only as they were before Pearl Harbor but as they were practiced 25, yes, even 50 years ago. If you were to swing back the roof of another plant you would see goods on the move in a

manner that makes you feel proud of the progress of American industry.

Fundamentally, materials handling was, is, and always will be lifting and shifting operations. The only difference between ancient

Before industrial survey, NAS Pensacola depot looked like this.

After survey. Space is saved; mechanical equipment can be used.



and modern times is in the methods and means used to get material from where it is to where it is needed.

Before the industrial revolution, the nations of the world basically were agricultural. Life, relatively, was simple and leisurely. Strong arms and backs were the principal requirements of labor. But even then the desire for greater production made man find ways to do more from sun to sun.

It was not until long after mechanization replaced handicrafts that men of industry developed tools for specific materials handling jobs. These tools have been improved through the years. Today efficient conveyors, hoists, hand lift trucks, and power trucks are available to all who require them and will adopt them.

Opportunities

Just as low-cost mass production cannot be a reality without complex high-speed machine tools, so low-cost materials handling is impossible without modern materials handling machinery. As a matter of fact, one of the biggest reasons why many companies still fail to produce as economically today as possible is that they do not appreciate the cost-cutting opportunities provided by time and effort saving materials handling machinery.

It is one of the mysteries of the present era that it took the gigantic production requirements of a second World War to awaken management to the tremendous savings that modern handling tools and methods can assure.

During the generation before 1941, materials handling was relatively new as an engineering science. Planning for the movement of material within a plant was rarely considered. Proof aplenty is found in the types of industrial construction then. Manufacturing and warehousing buildings were multiple-story structures, with low overhead space and limited floor-load capacity. Such physical plant conditions still in existence make it difficult to operate modern materials handling machinery efficiently.

Formerly, the purchase of materials handling equipment was considered a capital investment to be written off in a period ranging up to 10 years. Actually, that equipment should have been looked upon as production tools, as an investment that quickly pays for itself in time, effort, and money savings.

Even now many plant operators do not know or don't fully appreciate that the handling of materials in a plant eats up from 25 percent to 40 percent of production costs. The reason they don't know is that the cost accounting systems of most companies do not show what is paid to workers hired specifically to lift and move materials. In other words, it is still usual in time studies and cost accounting to allocate some material handling costs to production, or to charge such costs to overhead as "indirect labor payroll" on the operating statement.

While industry has done a marvelous job of mechanization of specific processing operations, much can still be done to cut costs by perfecting handling methods.

Thus, until management, more generally, sees that production is material in motion and learns how to keep it moving economically future progress in cutting costs will be retarded.

Before the war the fork truck seemed to be the modern materials handling machine with the brightest future because it simplified the movement and storage of large unit loads on pallets in the plant. In addition, it made possible the compact ceiling-high warehousing of goods, thus utilizing storage facilities to the fullest, often making it unnecessary to invest in new construction.

Experiments

During the war, the armed forces greatly accelerated the popularity of the fork truck. With almost no limit on the money available for experimental purposes, officers thoroughly trained in materials handling engineering clarified the broad application range of the fork truck. As a result, millions and millions of tons of equipment and supplies were moved and warehoused with speed and efficiency never before thought possible.

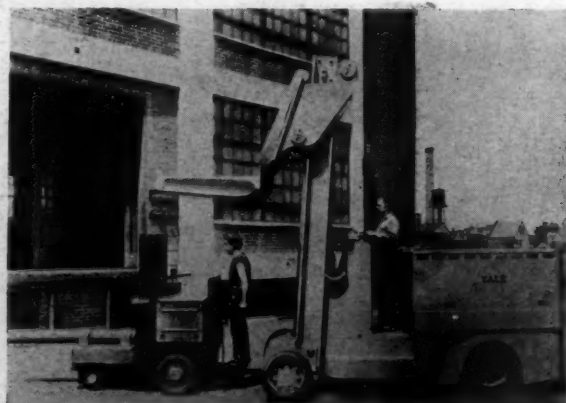
Many manufacturers, large and small, who became acquainted with the fork truck during the war, now are interested in materials handling equipment not from an investment standpoint but as a means of increasing production and cutting costs.

In considering new plant construction, they are planning single story buildings and devising layouts for machine tools which include provision for efficient materials handling. Moreover, they are beginning to appreciate that the fork truck and pallet handling system has many money-saving possibilities beyond mere in-plant service. They are beginning to visualize how great the all around savings can be if both incoming and outgoing shipments are on pallets.

The most serious problem they are up against right now is pallet cost, the lack of standardization in pallet sizes, and the cost of getting empty pallets back to the plant. However, progress is being

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A 2500 lb. fork truck contrasted with 25,000 lb. ram truck. The two models represent 10 years of progress in materials handling equipment.





Users and potential users of fork trucks should understand the four basic factors which govern maneuverability. In this article, Mr. Ulinski reveals how to avoid buying fork trucks equipped with impractical steering systems.

Steering Toward Fork Truck Efficiency

"MANEUVERABILITY" has come to be a popular word in America since the beginning of the war years. Literally every vehicle used by the armed forces from bomber to jeep has had its maneuverability advertised, discussed and judged. And maneuverability, in fact, did win many a battle, including an important phase of the battle of logistics.

The modern fork truck, which perhaps more than any other single device helped solve the government's huge problems of warehousing and transportation, is one of the most maneuverable machines ever invented. It has to be, for probably it is steered more continuously and more dexterously

than any other type of commercial vehicle.

The fork truck must steer easily forward and backward, through narrow intersecting aisles and doorways, in and out of boxcars and elevators, over smooth floors and rough runways, over sills and other obstructions and up and down ramps. It must be steered adroitly, accurately and quickly when picking up and stacking loads in congested storage or ship-

ping areas. Its movements, while hauling loads of many tons, must be made as precisely and effortlessly as those of a child's tricycle.

The answers to the demands made upon fork truck steering assemblies are intricate. These complex solutions have taken engineers and designers many years to evolve. Fork truck users need not try to understand all of the many factors involved.

However, since steering is such a vital factor in efficient fork truck operation, users should understand the few basic differences which make some trucks steer smoothly and others unsatisfactorily. Checking only four principal features will enable a poten-

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By B. I. ULINSKI

Chief Engineer
Automatic Division
Automatic Transportation Co.
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FIG. 1

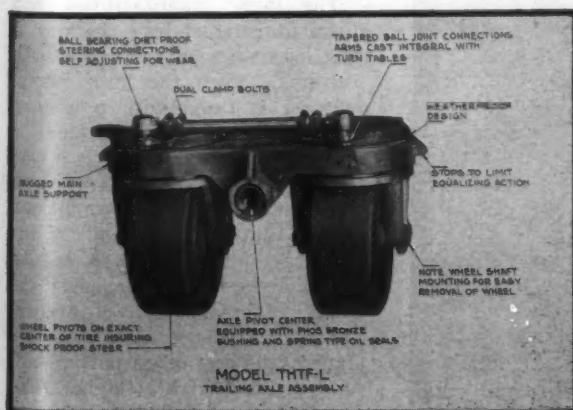


FIG. 2



While many industries can use the fundamental principles and methods of unit load shipments developed by the armed forces, before unit loads can be economical commercially, it will be necessary to establish closer coordination among manufacturers, warehousemen, common carriers and dealers.

Unit Loads

By MATTHEW W. POTTS

Materials Handling Consultant

THE army and navy found the principle of unit load shipments one of the best to facilitate the handling of a large volume of materials in uniform packages, and, in some instances, especially on overseas shipments, it was even found advantageous for packages which were not uniform in shape, but which could be palletized to make a uniform unit load.

The advantages of unit load shipments have been widely publicized and many manufacturers have come to feel that the unit load is the cure-all for their individual handling and shipping problems.

The shipper anxious to take advantage of the savings effected by the army and navy, should be cautious in making plans to utilize the unit load principle of ship-

ment. The many articles that have been published, the many lectures and speeches that have been made, regarding the advantages of the unit load shipment by the armed forces, have been based on the application of the principle to a tremendous movement of materials.

The writer has given lectures on this subject to many army and navy officers in training groups in his capacity as Materials Handling Coordinator for the Quartermaster General, United States Army, and as Technical Consultant for the Bureau of Supplies and Accounts, United States Navy.

In lecturing both to service and civilian groups, the lecture was based on actual operations being performed in army and navy installations under the stress of the war emergency and without having to give thought to competitive industrial conditions or costs. We considered only the savings that could be made in time and space, regardless of cost. Time was the factor which determined the use of unit loads.

While many industries can use the fundamental principles and methods for unit load shipments developed by the army and navy, before unit loads can be economical commercially, it will be necessary to establish closer coordination among manufacturers, warehousemen, common carriers and dealers.

At present, too many small manufacturers are being advised to try and save money by unit load shipments, palletized or otherwise, and the writer feels that this is starting at the wrong end of the road.

The large manufacturers and distributors must lead the way if unit load shipments are to become universal. Even the large manufacturer is faced with a number of problems that did not face the armed forces. In the first place, the manufacturer is faced with economic competitive conditions, and he must evaluate all of the advantages of unit load shipments, in order to balance or offset the possible increased cost of preparing such shipments. In some instances, the cost of preparing unit loads is only slightly higher than regular packages. This is particu-

Unit loads can be palletized directly from production line by placing pallets in boxcar.



Right: Strapped unit loads must be palletized outside of the car. Filling the space between loads prevents shifting. Center: Unit loads may be stacked four or more high in warehouses having high ceilings. Below: In warehouses with low ceilings, loads may be stacked two-high in order to save time and storage area.

arly true where the cases can be built with runners to permit the entrance of forks for lifting.

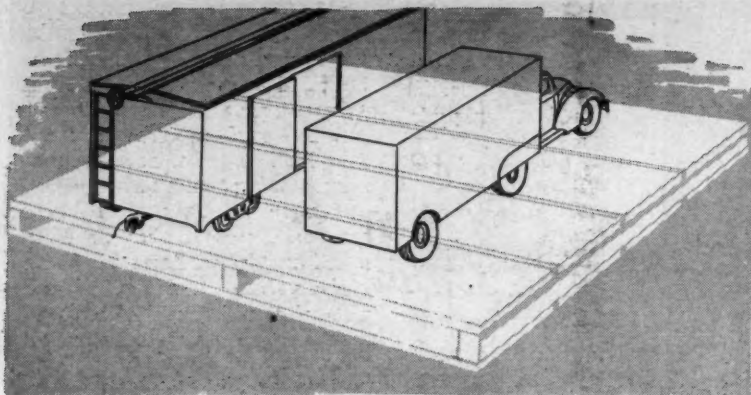
In other industries, preparation of a unit load such as the navy clothing depot prepared, which has been used for some time by the paper industry in shipping skid-loads of paper, it has been found that the cost is no more than it would be if smaller containers were used. The advantages of the unit load are reflected in all of the steps of distribution from point of production to retailer. These are the shipments which automatically fall into the unit load classification. But in many instances the manufacturer is faced with the problem of shipping to a number of small users, who cannot take a unit load advantageously. In many cases, the manufacturer himself does not produce in sufficient quantities to justify preparing his shipments in unit loads.

Small manufacturers should be cautious about starting a system of unit load shipments, even though they might use the unit load method for handling within their own plant up to the point of shipment. Just because the unit load cannot be shipped out of the plant is no reason why it should not be used within the plant through the various stages of production, handling, storing, and loading. At the loading point, the unit load is broken down and placed directly into the car by hand, which is no more expensive than if some other method of handling were used within the plant.

Too frequently, industry will start off with unit load shipments without making a survey to see if the carriers and the consumers are equipped with the proper mechanical devices to handle unit loads. In this way, they spend

(Continued on page 58)





Progress In Pallet Simplification

There seems to be no good reason why industry cannot adopt a procedure of distribution which makes the merchandise "fit the container, which fits the pallet, which fits the box car or truck."

By W. E. BRAITHWAITE

*Division of Simplified Practice
National Bureau of Standards
Washington, D. C.*

THE recent survey made by the distribution division, Bureau of Foreign and Domestic Commerce, disclosed the need for simplification and standardization of skids and pallets in order that unit loads might flow more readily through the various phases of distribution in the grocery trade. This survey of streamlined wholesale grocery operating methods revealed that most wholesalers receive carlot and draylot shipments case by case. These cases are built into pallet or skid loads at the receiving dock. Handling which took place when the manufacturer or other shipper loaded the car or truck is duplicated.

These findings were brought to the attention of the division of simplified practice, National Bureau of Standards. It has

become apparent that simplification and standardization of skids and pallets must proceed slowly because of the many sizes, styles, and shapes used by wholesale grocers, grocery manufacturers, and by those who transport for them.

Such factors as car interior dimensions, truck body interior dimensions, post spacings in warehouses and the turnover characteristics of distributors in the food field must be taken into consideration. It is important that the interest of no group be compromised or sacrificed, since the procedure of the division of simplified practice requires that, for promulgation,

This article is part of a report presented by Mr. Braithwaite at a recent meeting of the National American Grocers' Assn. at Atlantic City, N. J.

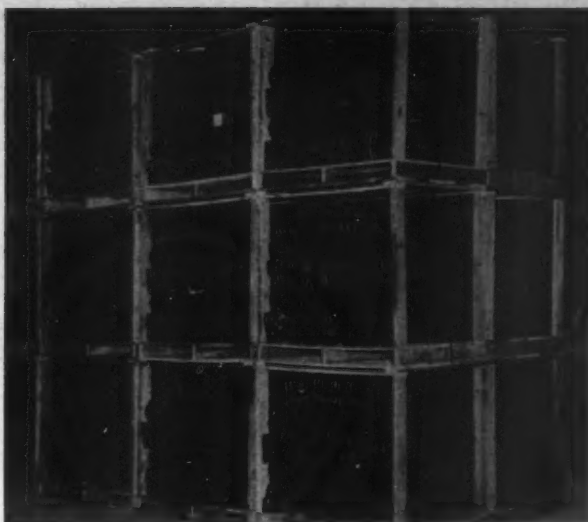
a recommendation must have the support of all elements of an industry, i.e., manufacturers, distributors, and users. Success of the program will depend entirely upon the degree of voluntary adherence.

The number of sizes of skids and pallets now in use are legion. These sizes have been established by individuals to fit existing buildings or available equipment. From time to time, some of these dimensions have been passed on to others, who viewed them as the products of deep research. They are not. As pointed out in the pamphlet, *Streamlined Wholesale Grocery Warehouses* published by the Department of Commerce, it would be a freak of chance if anyone's skids or pallets were ideal for the whole range of uses to which skids and pallets may be put.

In April, 1945, a meeting of the grocery pallet committee was held at the National Bureau of Standards. Representatives of wholesale grocers and processors attended this meeting. It was found that the army used the 32 by 40 in., 36 by 48 in., and 48 by 48 in. pallets for subsistence items. A representative of Heinz Co.

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Right: Modern method of palletizing shovels.



Palletizing Wholesale Hardware

Palletized unit loads cut handling costs, allow maximum use of storage space, reduce loading and unloading time, add safety factors, lower time in costing physical inventories, and cause less damage to merchandise.

By JAMES G. KRAUSE

President
George Krause Hardware Co.
Lebanon, Pa.



Mr. Krause also is chief engineer, Crescent Truck Co., Lebanon, Pa., and assistant treasurer, Pennsylvania Wholesale Hardware & Supply Assn.

THE fork truck pallet system of unit loads, involves the use of industrial type fork trucks to load and unload, move and store uniformly packaged lots of goods on pallets. The unit loads are assembled for shipping at the point of manufacture and remain on the pallets until final distribution, when it becomes necessary to move the particular item in quantities less than that required to make up an individual pallet load.

Some of the advantages to be gained by full or partial use of the pallet system are as follows:

1. **LOWER HANDLING COSTS.** Substantially lower handling costs are immediately achieved by adoption of the unit load system. Goods are moved more rapidly with less labor and fewer handling operations.

tions. As an example, consider the present method of unloading and storing a carload of nails, that is, manual hand trucking, two kegs per load, and placing and storing one keg at a time. This method requires approximately 18 to 20 man-hours per car. If the shipment arrived, eight kegs on a pallet, and was moved and stacked by a fork truck, this would be reduced to two and one-half or three man-hours. In addition, similar savings would be realized in movement from storage for distribution.

2. **MAXIMUM UTILIZATION OF STORAGE SPACE.** One of the greatest advantages of the fork truck system is the complete utilization of storage space, often to ceiling height. This advantage naturally depends on floor capacities.

On one hand, there are many bulky loads of average unit weights that are not stored more than a single layer high because of the difficulty in handling them or because of their lack of adaptability for safe stacking. Some examples of this type of items are shovels, scoops, sleds and many other unpackaged items. A considerable number of these materials could

be suitably palletized for storage and stacked to the ceiling.

On the other hand, many of our first floor warehouses and basement storage spaces have floors of very high load ratings. Much of this space is correctly utilized for heavier items such as paint, drums, roofing, nails, pipe fittings and so on. But, unless these items are packed in small weight units, a great deal of space to ceiling height is not utilized or, when it is, only at the cost of expensive and slow handling.

Consider the large saving of this most valuable floor space that could be achieved in a 10 ft. ceiling area where 50-gal. metal drums of various liquids are stored. These drums usually weigh from 350 to 500 lb. and consequently are now stored one high on end or side. A fork truck and pallet arrangement would make it possible to go three high with these materials thus making two-thirds of the present space available for other items.

Case histories demonstrate that warehouse capacities have been increased from 20 to 50 per cent by the introduction of pallet methods.

3. REDUCED TIME FOR LOADING AND UNLOADING. Speed in handling materials when unloading and loading cars and trucks is advantageous both in reducing costs and smoothing out labor requirements. Savings are achieved by eliminating demurrage in the case of railroad cars, and in greatly decreasing the time that dealers' own trucks are stationary. Because of the irregular arrival of car

load shipments and the seasonal peaks prevalent in the wholesale hardware trade, it is often very difficult to maintain an adequate shipping and receiving force to cover the peaks without halting regular operations during these periods and to operate an economical force during the many lulls between. The speed of the unit load system and its small manpower requirements can largely eliminate this problem.

4. IMPROVEMENT OF EMPLOYEES SAFETY. A review of the compensation cases in the wholesale hardware business will reveal that a majority of injuries occur while moving materials. There are many rupture injuries. Flexible mechanical equipment provided with all modern safety devices will minimize injuries of this nature, improving employee morale and efficiency and reducing compensation costs.

5. EASE AND ECONOMY IN TAKING INVENTORY. Uniform palletized loads in storage by their very nature reduce the time and cost required for taking physical inventories and also improve the accuracy of the count.

6. LESS DAMAGE TO MERCHANDISE. Because it is necessary to handle unit loads less often per piece in every operation than required by other methods, the chance of damaging materials is greatly decreased. In addition, the pallets and strapping act as protective shields to further reduce damage.

The advantages to be achieved by an application of the unit load method varies directly in proportion to the volume of business in each individual case. Therefore, we must consider several basic factors in order to determine whether or not the pallet system will prove to be an economical method if adopted.

First, in the wholesale hardware business, handling merchandise is our largest operating cost. Therefore it offers the best opportunity for savings to meet ever growing competition and to increase profits.

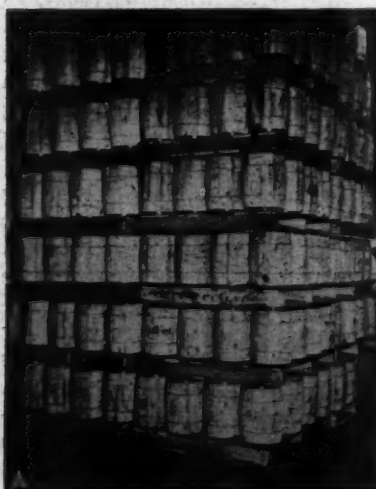
Second, the nature of our business, involving the handling of thousands of items variable as to quantity and physical dimensions, requires extreme flexibility of any system of materials handling employed.

Third, our warehouse facilities are of fairly ancient vintage with small elevators and limited floor capacities, thus restricting the size and weight of mechanical materials handling equipment.

Fourth, because of peaks and intermittent operations, the opportunity for maximum savings is reduced. It is therefore necessary to obtain an extremely economical type of machine.

THREE PRIMARY OPERATIONS. The three primary operations in conducting a wholesale hardware business are sales, purchasing, and materials handling. The increasing threat of chain and cooperative enterprises is not going to per-

(Continued on page 105)



Palletized Cylindrical Objects.
A. Columbus Q. M. Depot.
B. Pueblo Ordnance Depot.
C. Columbus Q. M. Depot.

Some practical examples of what can and has been done to modernize handling methods at relatively small cost in a public merchandise warehouse that has been in operation for 50 years.

Meeting Handling Problems In a Public Warehouse

DURING the war it became quite evident that a distribution type of public merchandise warehouse must find means by which handling operations could be speeded up and costs reduced to the lowest possible figure. Since the war it has become apparent that such problems must be squarely and promptly met, partly because the large lot storage account is rapidly disappearing and the accounts most likely to be served by a public merchandise warehouse are the kind that require numerous small-lot deliveries.

Our warehouse is typical of many that have been in operation for a great many years. In our case we are now well into our 50th year. Our's is a multiple story building that was never equipped with sufficient elevators. It is four stories and basement, served by a private railroad siding with a five-car capacity on the north side of the building. Along the west end of the building is a loading platform with capacity for six trucks.

One unique feature of our building, and one which in some ways is a problem, is that it is served by two streets at different levels. The first floor level is served by a street on the south side and the north and west side of the building are served by a street at the second floor level. This also locates the railroad siding at the second story level. Consequently all car unloading and pool car distribution takes place at the second story, or practically the

By RAY M. KING

President

King Storage Warehouse Inc.
Syracuse, N. Y.

middle of the building, in relation to floors.

As the volume of deliveries in-

creases, the problem of unloading and delivering with one large, high speed elevator increases. The possibility of a second elevator was studied and abandoned because of prohibitive costs under present conditions. We then studied the possibility of a belt and roller conveyor system. This has been in-

Roller conveyor permits merchandise to move from box car

to storage space with maximum economy and efficiency.



stalled and has proven itself to be a sound investment.

The conveyors are located so as to serve only two cars at present, permitting the movement of stock either from or to the car. The belt conveyor goes from the second floor down to the first floor and from the second floor up to the third. It is anticipated that we will find it desirable to extend the system to the fourth floor, but not to the basement. From these belt conveyors, 10 ft. portable sections of roller conveyor and curves provide for the movement of goods to and from the pile and the belt conveyor. The particular advantage has been that carloads can be unloaded by the use of the conveyor, leaving the elevator free for the shipping department. This alone has cut down lost time considerably, since it eliminates competition between the inbound and outbound crews for use of the elevator.

We have not attempted to reach every part of the floors served by the belt conveyor with a gravity

line, but where the run is sufficiently long, we use a portable booster which can be used also as a piler or stacker. This small unit has proven itself to be advantageous in loading trucks where the floor level is below the bed of the truck. The reason for the use of a booster in connection with the gravity line is that in order to use the system both for inbound and outbound loads, the roller conveyor system must be level. Strictly speaking, the word gravity should not be used. The belt conveyor connecting the two floors has a tail piece, or head piece, which will push any commodity packed in cases for a considerable distance on level gravity conveyors. Beyond this point the booster picks up the cases and continues to push them either to the end of the line, or in the outbound movement to the tail piece of the belt conveyor.

Where formerly a minimum of four men with the use of four-wheel flat trucks and the elevator were needed to load or unload a

car, and in some cases a fifth man was needed for the elevator, the conveyor system now, in most cases will unload or load a car with three men. In other words, one man can feed the conveyor as fast as two can take the stock off and pile or stow it in the car.

The problem of small-lot deliveries and pool-car distribution in our case has been improved materially, and has enabled us to increase our use of lift trucks, platform trucks and four-wheel standard warehouse trucks.

We have added to our equipment, and found it to be one of the most popular pieces of mechanical handling equipment we have ever used, a skate or wheel conveyor in 10 ft. sections with adjustable legs which are equipped with two small wheels for easy movement. We also find the wheel type conveyor without attached legs to be very helpful, particularly in loading or unloading large semi-trailers and in leveling off stop-over cars. Incidentally, our trucking department has found these light sections of conveyor to have many uses when making local deliveries from the truck.

In discussing mechanical handling equipment in our warehouse, we should mention one change that has increased the speed in which we can load trucks by at least 25 percent. Because our loading platforms were built during the days of horse-drawn trucks, as were many other warehouses and freight terminals, we were confronted with the problem of loading and unloading modern motor trucks, particularly large semi-trailers, which were from 12 to 14 in. higher than our loading platform.

We were fortunate in having a rather large open yard in front of our loading platform. By excavating the driveway directly in front of the loading platform 14 in. at one end and 6 in. at the other end of the 40 ft. dock, this excavation going out to grade level 35 ft. in front of the dock, we were able to bring big trucks down to platform level, so that with small iron bridge plates our jack-lifts or four-wheel trucks could run right into the truck. Fortunately, we had good drainage and have had no

(Continued on page 100)



Conveyor leads from the car to a storage area at lower level.



Cartons are stacked from end of conveyor on designated piles.

Railroad Loading Practices

NEW methods of loading commodities for standard rail shipment have received comparatively little attention from the standpoint of reducing distribution costs.

Yet most commodities move by rail, and the greatest potential for sizable cost reduction lies in this field. Traffic managers too often have taken it for granted that little improvement or change can be made in loading and handling diversified materials for rail shipment. When particular commodities have required special handling, elaborate devices to meet a particular need have been developed. However, it must be acknowledged that such devices (the refrigerator car, for example), have increased the total cost of shipment, and have proven useful only for the specialized type of commodity for which they were designed.

Railroad management naturally is concerned with the twin aspects of increased efficiency and reduced cost in freight handling, but the general viewpoint of railroad men is to feel that handling costs are

The trend is toward the use of powered equipment; fork trucks, tractor trains, and many types of hoists. Specialized machines developed by manufacturing industries are being taken over by the railroads, especially for the handling of l.c.l. shipments.

By HAVILAND F. REVES

Detroit Correspondent

essentially the shipper's problem, rather than their own. It is felt, with some justification, that it is not the rightful task of railroad men to go into another industry and advise as to preparation of products for shipment.

The railroad is concerned primarily with furnishing the means of transport, and not with precisely how the commodity may be handled for shipment. This does not imply a lack of interest in improving ship-

ping methods, but rather a concentration upon the transportation field.

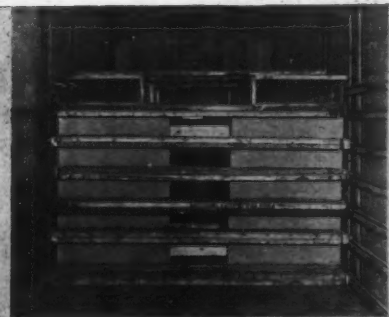
During the war, for instance, the tendency was to load cars to maximum safe capacity from the standpoint of railroad operation, rather than from that of internal damage. The roads want to keep loading averages high, though probably not up to wartime levels. Increased average payload per car and per train means reduced operating cost per ton-mile.

Speed of movement was the major objective, and practical consideration of efficient or economical packing were secondary. Excess dunnage was used freely to give the necessary protection under wartime shipping conditions, to the point that the excess might run as much as 2/3 above acceptable peacetime standards.

It is for this reason that not too much in the way of new developments is to be expected from the experience of the war years. The element of low cost, paramount in peacetime shipment, was not given the usual consideration.



Left: Loading 1,800 lb. gas boilers with ease and safety. Below: Safe handling of large sheets of plate glass. Right: Note compactness of this load of farm devices.



Increasing the safe payload per car is generally to the advantage of the shipper as well as to that of the railroad. The ideal minimum theoretically is set for each type of commodity by the minimum requirements of the rate structure, with any loads under this figure penalizing the shipper, while he benefits from reduced costs per unit on larger loads. Increasing the average load per car reduces his demand for cars, and assures quicker handling of his total shipment by the lowered demand for rolling stock, an especially important factor today, but one which is always present, even under ideal operating conditions, when enough cars are on hand to care for all requirements.

While wartime experience promises little progress in handling from the railroad standpoint, some major developments are anticipated in the near future by informed railroad men. These will lie chiefly along the lines of improvement in car design. Emphasis is upon designing cars so that they will be easier riding, and less susceptible to destructive impacts.

Improvements

Improvements in riding qualities are to be expected in newer cars, but they probably will not become general for many years, first because immediate car production must be concentrated upon filling the need for standard cars as soon as possible, which means production along established, rather than along new lines; and second, because many existing cars will not become obsolete for a long time.

The chief interest of the railroad operator today in new handling methods centers upon developments in palletization. New methods and experiments have been followed closely. The use of pallets requires comparatively little change in railroad handling operations. The changes in handling brought about by palletization are chiefly in the province of the shipper and the consignee.

The most significant new trend in this direction appears to be an increasing interest in one-shipment pallets. These low-cost pallets,

while not adapted to all commodities, reduce the original cost per unit of shipment, and eliminate the one troublesome element of pallets, the necessity of returning them. While it is true that the standard freight car itself must return empty if no return payload is found, the development of a well-

More Trailers

Expansion of facilities for production of stainless steel trailers has been announced by Fruehauf Trailer Co., Detroit. Introduced by Fruehauf in 1940, several thousand stainless steel trailers were placed in service before war interrupted their manufacture. The expansion program comes as a result of extremely satisfactory service reported by operators who have used these units through five years of wartime operation.

coordinated railroad system has long reduced this contingency to a minimum. Similarly coordinated handling of pallets of any other type of specialized shipping equipment probably is not possible to anywhere near the same extent at present, but it can be developed as pallet use and standardization increase.

Standardization of pallets, the next important step on this path, is already fairly well advanced. Encouragement by railroads to the use of pallets will mean an increase in their use, and an increased efficiency of car use, since pallets permit a greater load per square foot of car floor space.

Challenging the use of pallets, conveyor systems in modern production, assembly and shipping use present a special problem. Established and practical plant operations frequently require the line to run adjacent to the car to be loaded or unloaded, or even into the car itself in some instances. In such installations, the use of pallets does not dovetail with the use of a conveyor line, and new techniques must be devised.

The major field for improvement in handling of carload shipments appears to lie in the produce industry. Hand-to-hand movement of cases of produce is the too common rule. Little has been done to improve handling methods, aside from

such obvious improvements as conveyor belt systems in some terminals. Rehandling costs are consequently high by comparison with those for manufactured goods. Shippers would welcome a thorough study of possibilities for modernization and economy in this field.

In the field of l.c.l. shipments, the picture is very different. Railroads meet needs in handling facilities more varied than those faced by any other industry. All the specialized requirements of individual industries are summed up in the shipping problems presented to the roads.

That l.c.l. handling has not reached maximum efficiency all railroad men would agree. Each road has met the situation on its own, seeking to serve the needs of its own customers, and there are great differences in merchandise carried by various roads.

The trend is to the use of power equipment, fork trucks, light tractors, tractor trains and many types of hoists. Machines developed by manufacturing industry are being taken over by the roads to handle l.c.l. shipments. Since each freight car may carry two dozen different commodities, the problem is a very intricate one.

Objectives

Major objectives may be stated as the reduction of costs through

1. Cutting down loading and unloading time.
2. Elimination of dunnage, which represents a waste of material and a loss of time.
3. Reduction of loss by breakage or other damage in transit.

Specialized gear to handle individual types of commodities has been developed, but this inevitably increases the expense of shipment, and usually means a return shipment of gear to point of origin.

Specialized equipment, useful only for one or a few commodities, is wasteful, although in many fields the volume of a particular class of traffic may justify its use. General purpose equipment is more nearly the ideal.

The navy made extensive use of a general purpose utility loader de-

(Continued on page 146)

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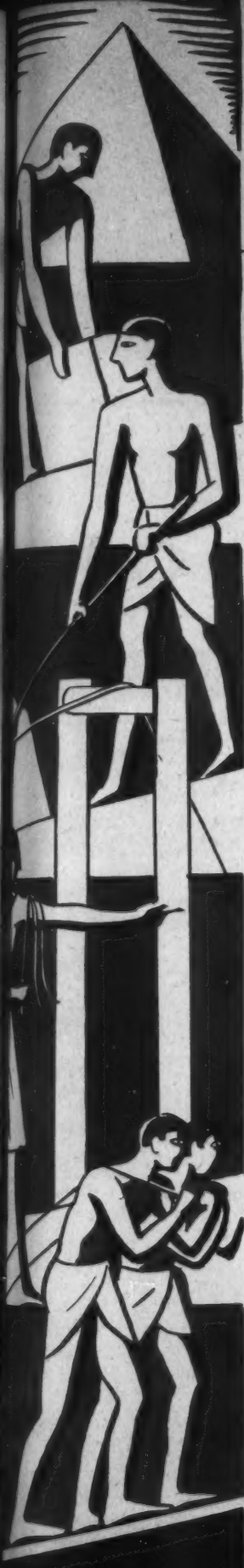
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Since Prehistoric Man . . .

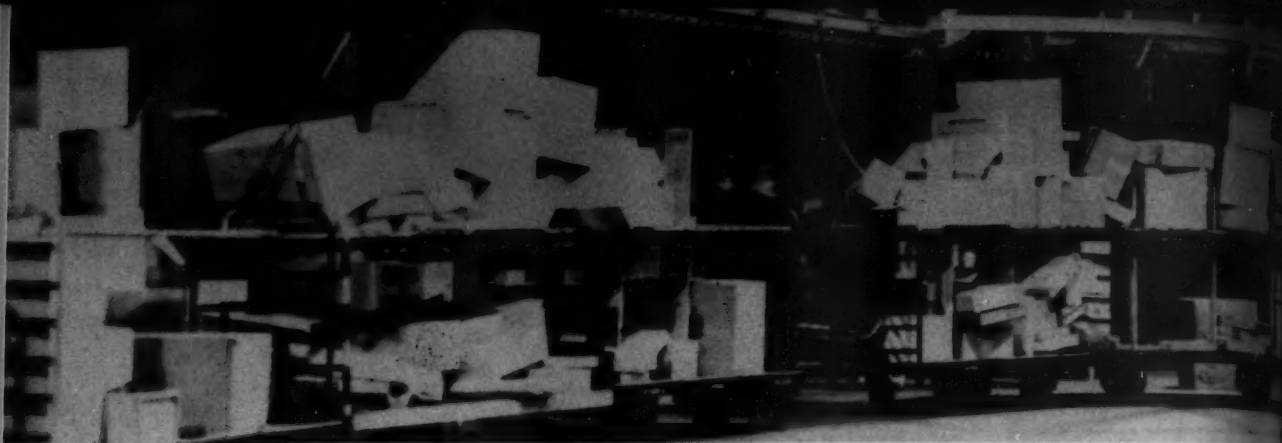
Since prehistoric man discovered how to use the limb of a tree as a lever to move a rock succeeding generations have devised various implements to assist them in shifting, lifting and carrying heavy objects.

All of the tools and equipment men have invented to help them shift, lift and carry are based on principles of mechanics that are very ancient. The lever, the pulley, the wheel and the inclined plane antedate history.

Two thousand years before the Christian era massive blocks of stone were hewn in Egypt for construction of the great pyramid at Gizeh. The huge blocks were placed on sledges at the quarries and drawn by oxen to the building site. These gangs of slaves, with the help of rollers, pushed and dragged the heavy rock up specially built causeways, or inclined planes, to a position where the material could be raised and swung into place by means of crude cranes planted on the upper tiers of the rising structure.

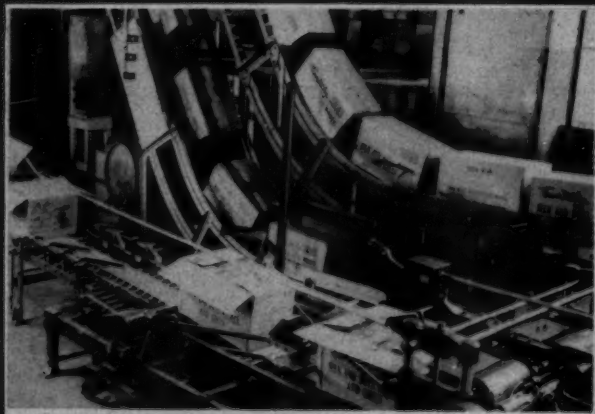
Today, in construction work, in manufacturing, and in the distribution of goods and materials, we still use the basic principles of the lever, the pulley, the wheel and the inclined plane. But we have adapted them to new forms of energy and have learned how to apply them to new problems.





The continuous overhead conveyor system consists of an endless circuit overhead monorail track, beneath which moves an endless chain connected

New Uses of Old



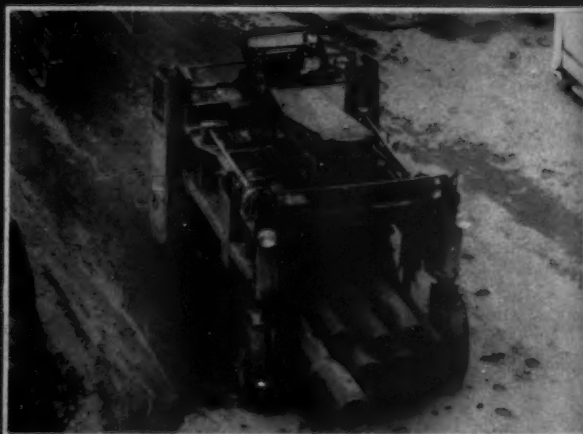
A roller conveyor system, supplemented by boosters, may be used for raising or lowering cartons as they pass through processing phases. Roller conveyors are well suited for the handling of fragile goods.




This novel combination of fork truck and tractor trailer train permits the rapid loading of air cargo. The entire trailer is lifted to the cargo hatch by a fork truck. Note slots in side of trailer.



The fork truck operates at greatest efficiency when it is used to load or stack palletized merchandise. Fork trucks are not trailers, and should not be used for transporting goods over long distances.



Straddle trucks were designed primarily to handle lumber in bulk. However, they are used extensively for transporting various types of structural shapes. Some straddle trucks carry up to 30,000 lb.



to trolleys spaced at regular intervals for supporting or propelling heavy loads.

Principles



While the basic mechanical principles of materials handling are very ancient, the broad application of those principles to problems of mass production and world-wide distribution has been a development of the past quarter century.

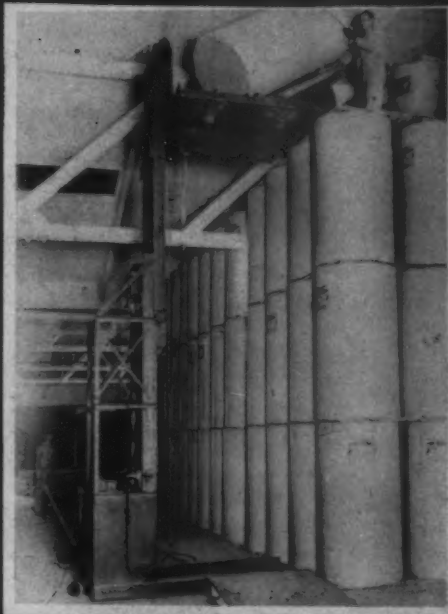
New uses of old principles, introduced during and immediately after the First World War were employed extensively and intensively for handling freight during the Second World War.

Many wartime innovations and developments in mechanical handling are now established practices in commercial operations. This is true both in production and in distribution.

But many former GIs, as well as others, now in modern business find it difficult to realize that 30 years ago most of the handling methods illustrated herewith simply did not exist.



The wharf crane is used primarily for loading and unloading cargo vessels. This equipment often is used in shifting freight from ship to a box car.



The tiering machine may be used for piling cases, rolls, bales, etc.; unloading trucks; overcoming floor level differences; and for storage in racks.



This new development in handling equipment, the tramrail stabilized platform, has a capacity of

Packing and Packaging



Transportation



Warehousing



Marketing



Insurance



Handling



Finance



Service and Maintenance



ALL PHASES OF DISTRIBUTION...

Handling methods affect costs in all phases of distribution.

PACKING AND PACKAGING and all auxiliary operations connected with shipping, such as grading, boxing, baling, bottling, crating, strapping, palletizing, stowing, bracing, etc., entail handling of one kind or another.

TRANSPORTATION depends on it. Nothing from raw material to finished product can be transported by air, highway, rail or water without being handled at least twice at point of origin and at point of destination.

WAREHOUSING could not exist without it. About 85 percent of warehousing activities consist in the handling of materials. Warehousing costs soar when manual methods are used.

MARKETING costs are influenced by handling methods. Inefficient handling at any stage of distribution increases costs all along the line and those costs are reflected in the price consumers have to pay for goods.

INSURANCE rates are affected by handling efficiencies and, in many instances, are based on experience records. Product liability insurance which protects manufacturers, wholesale and retail distributors, users and handlers against claims and lawsuits, whether justifiable or groundless, is an example.

FINANCE is involved. Although 75 percent of the industrial firms responding to a recent questionnaire on materials handling, sent out by the Electric Industrial Truck Assn., affirmed that transportation and handling costs were large items in their overall costs, more than 66 percent was unable to ascertain such costs as separate elements of total expense from their present cost accounting systems. Such an indictment of present cost accounting methods needs managerial attention.

SERVICE AND MAINTENANCE require handling equipment and handling equipment requires service and maintenance. The care of goods and equipment is needed at all stages of distribution.



The preferred numbers system is a rational approach to the problem of setting up product size and performance ranges in the interest of standardization and simplification for more efficient and economical production and distribution.

Rationale of Size Selection

By D. J. WITHERSPOON

Associate Editor

IT HAS occurred many times to many persons interested in production that more standardization and simplification are needed to effect greater industrial coordination, and that a long step forward would be taken if the selection of product size and performance ranges could be based on a scientifically determined rule, or formula, applicable generally throughout industry.

Such a rule, international in scope, does exist. Since 1936, it has been available to American industry as a nationally approved engineering and industrial standard. This rule is a rational method of setting up product sizes. Long used in Germany and other continental countries as an ideal means of promoting uniformity and interchangeability of fundamental parts, it provides a series of geometrically progressive "preferred numbers," which serve as a common denominator for "sizes" in the broadest meaning of the term.

The series is applicable not only to important or characteristic linear dimensions, such as diameters and lengths, but to areas, volumes, weights, and capacities. It is applicable to the ratings of machinery and apparatus in terms of horsepower, kilowatts, kilovolt-amperes, voltages, currents, speeds, power

factors, pressures, heat units, temperatures, gas or liquid flow units, weight handling capacities, etc. It provides characteristic ratios which frequently are translatable from one term into other terms. The physical dimensions of the parts used in the differently sized products constituting a range frequently can be "run off" as ratios on a slide rule, when the range was projected originally in other terms, kilowatts capacity, let us say.

Performance

It is a curious and arresting fact that in many cases where the product sizes making up a dimensional or performance range have been determined over a period of years by the inherent requirements of a market, rather than by tradition or competitive pressures, these empirically determined sizes sometimes have agreed to a remarkable extent with the geometrically progressive series of preferred numbers.

The preferred numbers system was developed in the 1870s by a French army officer, Col. Charles Renard, who, at the time, was in charge of an army aeronautical section. Col. Renard found that 425 differently sized cables, an excessive variety, he thought, were being used for the simple purpose of mooring captive balloons. Seeking a rational rather than an arbitrary solution to the problem, he developed a mathematical theory which since then has proved to be applicable to selection generally when function is a factor in size selection. As to the cables, they were reduced from 425 to 17 in the number of sizes selected. Diameters were expressed as units of strength. In France, the system of preferred numbers is known today as the "series de Renard."

Preferred numbers are so called to indicate that they can be used in all cases where there are no impelling technical or economic reasons for a contrary choice. The American standard, Z17.1-1936, according to John Gaillard, of the American Standards Assn., provides two systems of preferred numbers. "One," he says, "is in decimal values and, with minor adjustments, is identical with the French system. The other series

(Continued on page 110)

Cargo plane loading problems cannot be answered entirely by developing ground handling machinery. The answer probably is a combination of new types of handling equipment on the ground and in the plane.

Some Air Cargo Stowage Problems

By JOHN H. FREDERICK
Air Cargo Consultant



When planes are equipped with air cargo bins, it is unnecessary to tie down individual packages. Filled bins are secured by means of strap net gates.

EVER since air cargo has been shipped in planes exclusively devoted to it, stowage has been a problem. That is, the placing and securing of cargo in a plane has been something requiring considerable study. The chief objectives in stowing air cargo may be summarized as follows:

1. STOWAGE SO AS TO PROTECT THE PLANE OR CARGO FROM DAMAGE. A plane may be damaged or destroyed, its efficiency impaired, or the lives of its crew endangered by improper stowage. The principal types of improper stowage which endanger a plane and crew are those which affect stability. It

is the general practice, therefore, to keep heavier cargo well forward in a plane, within bounds of the leading edge and the trailing edge of the wing. Great care is taken to prevent cargo from shifting, and it might be noted here that a 3,000 lb. load can exert pressures to 7,500 lb. or more under certain flying conditions. A plane load of cargo must be so securely fastened that there is no slack. When cargo is held firmly no damage occurs in transit.

Because a plane climbs and glides down, banks and turns, drops into airpockets and rises over invisible bumps, something much better than the usual band iron, ropes and dunnage familiar to carload shippers by rail is needed. A sharp down draft, for example, can lift an entire cargo off the deck of an airplane, and the resultant upward strain may be 2.4 times greater than the weight

In the earlier days of air cargo, ordinary ropes, pulled as tightly as possible by manpower, were used. This method was far from satisfactory, because man cannot tie a rope tightly enough to secure heavy cargoes against pressure caused by banking, climbing, and sudden drops into air pockets. It is estimated that the average man can exert only 60 lb. pressure in tying down cargo, and of this pressure, 50 percent is lost by the time the packer knots the rope. Furthermore, hand tying methods are costly in time and labor. Rope,

(Continued on page 78)

TABLE I

Express Loading Time Factors				
Vehicle	Compartment	Lb./Min.	Loaders	Lb./Min./Man
C-47	Main	280	4	70
DC-3	Forward	135	3	45
DC-3	Rear	75	1	75
Express Car		144	2	72

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American Airlines Airfreight

Delivers More Sales

... For THE WALL STREET JOURNAL.



Wall Street Journals Go Aboard Flagships Every Night at New York



In the past seven months Journal circulation has jumped 34% in Chicago and 58% in Detroit largely due to the use of American Airlines Airfreight. So reports Robert M. Feemster, Journal Sales Chief and Executive Committeeman.

Airfreight permits the Journal to be delivered to its subscribers on the morning of publication in both Chicago and Detroit

instead of a day later—as was the case when surface transportation was used.

Costs are so low under American's new, reduced Airfreight rates, more and more shippers are utilizing Airfreight to speed the upcurve of their businesses — on all commodities, particularly perishables. Call your American Airlines Airfreight agent for full details.

AMERICAN AIRLINES

THE NATIONAL AND INTERNATIONAL ROUTE OF THE FLAGSHIPS



A cable from inside the trailer, powered by a winch, is attached to the bottom of the rack. The loaded rack, which weighs 1,700 lb., is drawn up ramp into trailer.

Cutting Loading Costs

Use of special mechanical handling equipment for loading and unloading bread trucks results in more efficient and economical distribution.

CUTTING a loading job from 480 minutes to 20 minutes means labor saving and reduced costs in the language of any distribution man. This is the experience of Langendorf United Bakeries, Inc., Los Angeles. It has been accomplished by clever use of an electric winch in loading and unloading operations.

Under the old system, two men took four hours each to load a trailer with 360 trays of bread, each tray weighing 40 lbs. The trailer had to be hand loaded through the rear end doors, the trays lifted individually, placed up into the trailer body and pushed back into the trailer one by one until eight tiers of trays were full.

Under the new system, the heavy, slow, tedious lifting and shoving is completely eliminated. Bread is now taken from the wrapping machine in the plant, placed into the trays, and the trays lined up on rolling racks. The racks are rolled out to the loading area and placed

By GIRARD NEFF

Special Correspondent

at the foot of a loading ramp which has been rolled into position at the open side door of the trailer (see illustration).

A cable coming from the inside of the trailer, powered by a winch slung underneath the trailer, is attached to the bottom of the rolling rack. A control switch puts the winch in motion and the loaded rack, weighing about 1,700 lb., is drawn up the ramp into the trailer body. The floor of the trailer body has been laid with trolley racks parallel to the sides and conforming to the position of the casters on the bottom of the racks. This serves to guide the racks into place and, when fully loaded, to prevent them from shifting or moving. The tracks are kept well greased so that as each rack is drawn into the trailer and the cable detached, the operator need

give only an easy push to send the rack up the tracks toward the front end of the trailer body. Capacity of 12 racks makes a compact, evenly distributed load tending to strengthen the body and create a safer load.

The unloading process also becomes easier and shorter with the aid of this mechanical handling device. It is no longer necessary for a man to stay in the trailer body and push the trays out to the rear end door where they then had to be lifted from the trailer one by one. The procedure is very simple now. The side door is opened and a ramp is put in place at the open door. The winch is put in reverse and the racks move through the open door and down the ramp.

The comparison of old and new unloading operation amounts to 360 separate, slow, manual handlings by several people against 12 mechanical operations taking one man only a few minutes, and handling a 10 percent greater load.

The winch, powered by a reversible $\frac{3}{4}$ horsepower motor and having a standard type drum and worm drive, weighs 150 lb. and costs about \$500. It is attached to the underside of the trailer body

(Continued on page 72)



*"Kids really watch their step in this town
... they teach 'em traffic safety in school!"*

And America's traffic accident rate would nose-dive if grown-ups took half as much care!

Americans are being killed and injured in street and highway accidents right now considerably faster than our armed forces sustained casualties in World War II.

Obviously, the danger in the battle zones was incomparably greater—yet it's easily possible that this year may see as high as 180 traffic casualties every hour here at home against a rate of 32 casualties an hour at the fighting fronts!

A gloomy picture with one bright spot

There's one bright spot in this otherwise distressing panorama of our most motorized nation in the world. During a period when fatal accidents among persons of all ages went up 114 per cent, the rate among children from 5 to 14 decreased 9 per cent.

This record spotlights the value of the excellent safety education pro-

grams in many of our U. S. schools.

Why can't all of us be equally careful?

To keep the accident rate down, there's much that can be accomplished by more highways that are specially engineered for safety.

More stringent traffic laws, where needed, help too—and "community pride" campaigns, of course.

But it's important to realize that most traffic accidents don't just happen—they're usually caused by someone. A motor vehicle driver—or a pedestrian—slips up and gets careless... new casualties go on the record books!

Driving is no job to take lightly

The average motor vehicle driver wouldn't think of trying to pilot an airplane without training. Yet plenty of people confidently take cars and trucks out on the streets

and highways who might have trouble passing a driving competency test.

In fact, the unskilled and irresponsible driver may well be the most serious of all menaces to traffic safety. Nationwide action is being advocated to make driver licensing more thorough and strict.

As one of the pioneers in building and working for increased traffic safety, Studebaker is convinced that the exercise of common-sense and self-discipline—by pedestrians as well as motorists—can help substantially in reducing the toll of highway injuries and deaths.

STUDEBAKER

South Bend 27, Indiana, U. S. A.

**BUILDER OF CARS AND TRUCKS
YOU CAN TRUST**

Unit Loads

(Continued from page 41)

considerable money preparing a unit which loses its advantage immediately it leaves their plant, and in some cases creates resentment because the receiver is unable to handle the load and must break down the unit. If a charge is made for the preparation of the unit, such as strapping, pallets, etc., then the consumer objects to the unit load being shipped to him because he obtains none of the advantages if he is not equipped to handle this type of load.

When inaugurating unit load shipments, large producers should survey their customers and find out what warehouses, transportation companies and receivers are able to handle unit loads advantageously, and only ship them to those that way who are equipped with the proper facilities for handling of unit loads to advantage.

Large manufacturers can take advantage of the unit load method of shipment on their own intraplant handlings. A number of the large manufacturers have already done so. The savings which have been made are substantial in money, and the time required for handling has been reduced materially. Furthermore, considerable saving of space has been effected in storage areas. Unit load systems have been carried right from the end of one production line up to the first operation on another production line in plants widely

separated and shipments have been made both by rail and truck.

This is the most advantageous utilization of the unit load system because it reduces the number of handlings of individual packages. For example, one large manufacturer ships fractional horsepower motors directly from the end of the motor production line in unit loads, without individual packaging, direct to his own appliance manufacturing plants, and also to many of his customers who build appliances using fractional horsepower motors. The advantage is in savings in individual cartons, the elimination of individual handling of each motor, the reduction in storage space and the simplification of handling to the point of use.

Advantages

Other manufacturers have shipped steel castings from their foundries in unit loads directly to the user with the same advantages. Fire brick manufacturers have found the unit load system of tremendous advantage, both within their own plants, and within the warehouses of their distributors and the plants of their customers.

Concrete block is now being prepared in unit loads for shipment by rail and truck, and bricks are being handled in unit loads from the kiln to the barge, transported

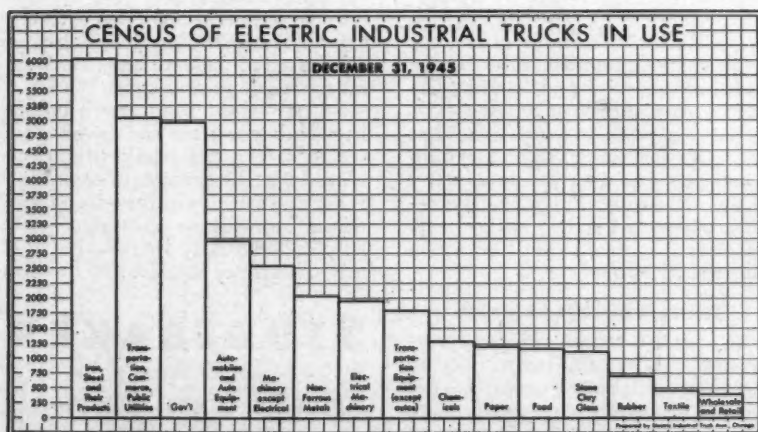
by water, unloaded to docks and loaded to trucks for shipment to the building site without the necessity of strapping or palletizing.

Lumber manufacturers are shipping unit loads of lumber with simple strappings both in gondola and on flat cars which is reducing the time of handling on unloading operations, transportation, placing into stacks, etc. Mechanical equipment is available for handling these unit loads, and economies can be effected if the volume to be handled is sufficient.

When unit loads can be prepared that do not require the return of any containers or pallets for re-shipment, the inauguration of this type of system is relatively simple, and many efforts have been made to provide what are known as one-way shipper pallets, which can be discarded after handling one load. However, a lot of merchandise will not handle satisfactorily on this type of pallet. So we are faced with the necessity of using more durable pallets and of returning them for more than one shipment.

This brings up a point which is handicapping a lot of shippers. The freight charged by the railroads for the pallet is based on the commodity being carried. This often increases the freight cost on this type of shipment. In addition, the rate for returning the empty pallets as a commodity is too high, thereby affecting the total cost even more, and making it impossible to show savings on a number of shipments that could be handled advantageously in palletized unit loads if freight rates were more satisfactory.

The carriers will have to find a way to reduce the tariff on the load bearing pallet when being shipped loaded, and also on the return. This will require a definite educational program and coordination between the American Assn. of Railroads, the American Trucking Assns., the National Manufacturers' Assn., etc. At present, such coordination does not exist and efforts which have been made by individual groups have been thwarted because of the lack of a centralized clearing house to conduct an impartial analysis for the benefit of all parties concerned.



EXIDE-IRONCLAD POWER PROVIDES THE THREE "HIGHS" THAT ASSURE FULL SHIFT AVAILABILITY



Exide-Ironclads have the *high power ability* needed to meet the higher kilowatt demands encountered in frequent "stop and go" service . . . they provide *high maintained voltage* throughout discharge, assuring a uniform rate of operations . . . and their *high capacity* keeps electric industrial trucks steadily on the job throughout each shift.

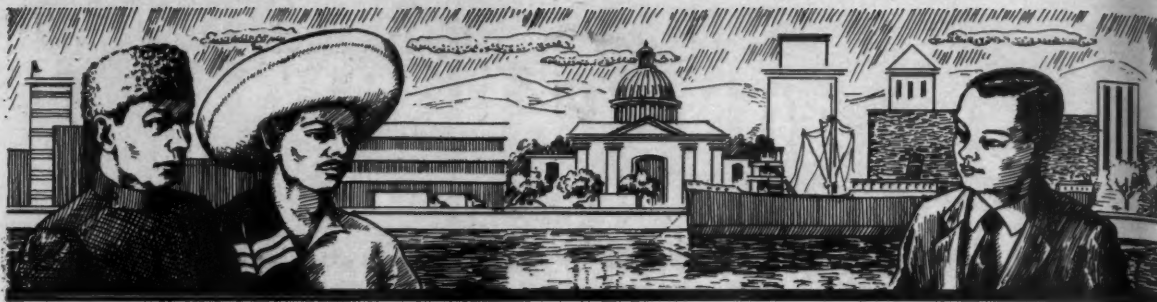
These—with Exide dependability, long-life, ease of maintenance and safety—assure "full shift availability," plus the increased tonnage and greater economy that result.

Write us for a FREE copy of the bulletin "Unit Loads" prepared by The Electric Industrial Truck Association. It tells how to cut handling costs up to 50% . . . covers latest developments in materials handling . . . and includes actual case histories.

DEPENDABLE POWER



THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto
JULY, 1946



Handling Equipment Abroad

INDUSTRIAL expansion with resulting need for materials handling equipment made great strides in many countries during the war and continues to do so now. Establishment of all kinds of enterprises in other countries was stimulated by the difficulty in getting consumer's products from firms normally exporting them.

However, it would be inaccurate to attribute the industrial expansion abroad solely to the war. Some local manufacturing of American products was undertaken in quite a few foreign countries long before the war. Automobiles, typewriters, radios, refrigerators, electric motors, and similar products, in the manufacture of which the United States leads, formerly were assembled from parts shipped from the United States or manufactured with materials and parts available locally in several countries.

A sound reason for this extension of American manufacturing to other countries through the medium of assembling or sub-manufacturing operations was the economy effected in freight charges. Parts for a number of units of a given product, whether automobile, or refrigerator, could be crated more compactly and, consequently, was subjected to a lower cubic measurement charge by steamship than if the bulkier com-

Growing industrialization in foreign countries is evident by the increased use of and demand for mechanical handling equipment of all kinds.

By **GEORGE F. BAUER**

International Trade Consultant

pleted product were sent overseas. Freight savings, in many instances, made it economical from the viewpoint of the final customer abroad to have products assembled or even partly manufactured locally.

Tariff protection, also stimulated local manufacture in many countries. Unlike freight savings, it is artificial and frequently increases the price of an article to the final buyer. It is often contrary to the best aim in world commerce which is to place more goods within buying reach of more people.

The need for economic production has become increasingly apparent to leaders of industrial enterprises in other lands. Magazines and publications on technical and distribution methods are just as seriously perused for new ideas

in other countries as in the United States.

Just how real the interest in materials handling equipment by people in other lands has become is evident from a few export figures.

In 1945, according to the Department of Commerce, conveyors of bucket and chain type went to other lands from the United States to the extent of 1,032 in number and \$940,844 in value, and other conveying equipment and parts to the value of \$7,237,576.

Electric lift trucks for use in factories abroad represented exports in that same year to a value of \$1,567,478. Other vehicles for materials handling were exported to a value of \$2,641,158.

Hoists exported numbered 20,746 valued at \$4,130,914 and cranes 1,050 and \$17,752,898 respectively.

These figures give a general idea of the manner in which managers of industrial enterprises abroad are putting American materials handling equipment to use to increase production and distribution efficiency.

Industrial expansion is going on in nearly all countries in varying degrees. Conveying equipment and parts for instance, went to as many as 72 countries. Such small countries as Greenland, Bahamas, Para-

(Continued on page 109)

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February 5, 1946

The American District Telegraph
Company of Indiana,
201 Sycamore Building,
Terre Haute, Indiana.

Gentlemen:

January 31, 1946 at 7:26 P.M. we responded to an alarm from your Aero Automatic Fire Alarm System in the Swope Art Gallery. On arrival, there was no indication, whatsoever, of fire in the building entrance, annunciator, located adjacent to the building entrance, showed fire on the third floor. After we entered the building we found the entire third floor full of smoke. Apparently a spark from a chimney on an adjacent building had lodged behind a window casing and set it afire. We have no way of knowing how long it took this fire to burn through the casing, but evidently your Aero System picked it up immediately.

The Swope building is a three-story and basement building, with the first floor a multiple occupancy, the Art Gallery occupying the second floor and the third floor vacant. The third floor has an open-joist ceiling and very little delay would have given us a fire of first class proportions. Destruction of the second floor alone would have caused a loss of well over \$300,000.

We were commended very highly by the owners of this property for holding the loss to a very small amount. This we attribute to the efficiency of your System which we recommend very highly.

Albert W. Rowe, Chief
Albert W. Rowe
Terre Haute Fire Department



Chief Rowe lauds efficiency of Aero System in protecting \$300,000 Swope Art Collection.

To avoid heavy fire and water damage in buildings housing objects of artistic and historical value, *speed* is a vital factor in the detection and reporting of fires.
• The outstanding effectiveness of the Aero Automatic Fire System in protecting such buildings, as well as

other types of structures and occupancies, is attested by the above letter from Fire Chief Albert W. Rowe of Terre Haute, Indiana. • May we tell you how this and other A.D.T. Services can help solve your protection problems? Write for descriptive booklet.

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Electric Protection Services
AGAINST FIRE • BURGLARY • HOLDUP
A NATION-WIDE ORGANIZATION

Fork Truck Efficiency

(Continued from page 39)

tial fork truck buyer to avoid manifestly impractical steering designs. These features are:

1. Guide wheel pivots.
2. Axle pivots.
3. Steering assembly bearings.
4. Operation and position of the steering wheel itself.

Any fork truck on which these four features operate efficiently has the fundamentals of a good steering system. Truck owners or potential owners can learn to detect these factors and to judge whether or not they are satisfactory in any specific truck.

Consider, for example, wheel pivots, perhaps the most vital fatigue and accident reducing feature in fork truck design.

Fork truck operation often requires that the guide wheels be turned at severe angles. This fact, combined with the extremely heavy load of counterweight carried by the guide wheels, makes almost every conventional axle design impractical. A conventional design could be used only with extremely long offset steering pivots. Such pivots, however, multiply the transmission of road shock to the steering wheel. This is true for the simple reason that increasing the distance of the steering pivots from the center of the wheels increases leverage proportionately, which in turn multiplies the shock transmitted to the steering linkage and to the steering wheel itself.

Road shock transmission is perhaps the major problem in fork truck steering design, even without the long offset pivots which would be required for use of a conventional axle. On rough runways, road shocks transmitted to the steering wheel through unsatisfactory axle designs are dangerously severe. There are innumerable cases on record in which operators sustained arm fractures when steering wheel grips jarred loose from their hands.

Such shock has been eliminated. "Shockless steering" has been achieved on high-quality

modern fork trucks. The principal involved is simple in itself, but it requires the finest in workmanship, materials and design. The principle consists of positioning the steering pivots at the exact center of the guide wheel. When such positioning is achieved precisely, no shock can be transmitted through the steering linkage, for the strain of shocks is always directly against the fulcrum of the pivot.

Mounting

We utilized this principle in designing a shock-proof steering system for Automatic trucks by building the axle over the wheels and mounting the wheels on a centered fork type caster (Fig. 1).

Such a steering system is essential to efficient fork truck operation under practical working conditions. Steering, especially over rough surfaces, becomes infinitely easier than with any other type of wheel-mounting design, since the guide wheels turn on a pivot point instead of through an arc.

Wheel forks are mounted on anti-friction bearings to reduce steering effort. All connection linkage, including steering gear unit, is also of anti-friction type, ball and roller bearing mounted. Such bearings are essential if a truck is to steer smoothly and

Expansion

Instead of a dearth in industrial building construction generally anticipated "after the war," the greatest expansion in history is getting under way. Despite strikes and shortages of materials, industrial "jobs" in progress are more numerous than at any time since the rush for war plants in 1942-43, according to Elwell-Parker Electric Co., Cleveland.

easily, and are the second important factor to be considered in judging a steering mechanism.

Suspension of the trailing axle is the third vital feature in fork truck steering mechanism design. Spring suspension has been found impractical on fork trucks, chiefly because of the great load variations placed upon the axles with empty or loaded trucks. Rigid-mounted axles are obviously impractical. The one satisfactory solution, we have found through extensive experimentation and years of designing experience, is a horizontally center pivoted axle mounting (Fig. 2). Such a mounting equalizes the load distribution on both wheels under all roadway conditions and allows all four truck wheels to be in constant contact with the floor or runway regardless of its condition. It also reduces the jar when traveling over a rough surface.

On the fourth important factor, operation of the steering wheel itself; there is still some confusion, especially as to the direction the steering wheel should revolve for a specific turn.

The answer depends upon the model of the truck.

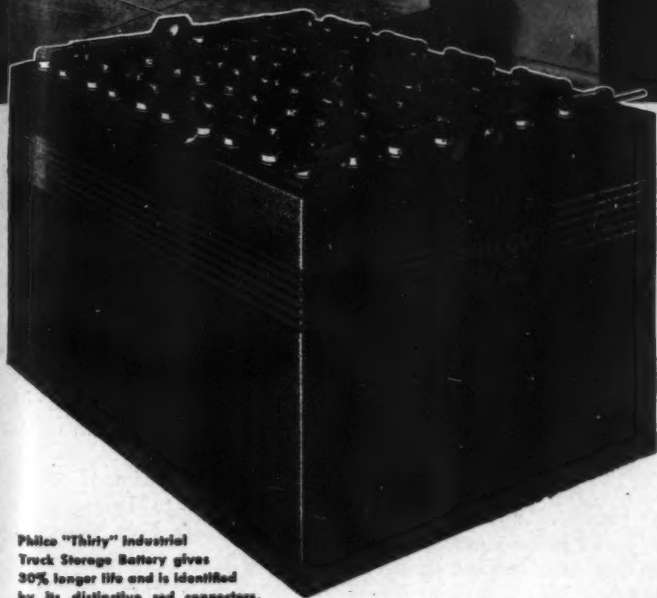
On models where the operator is seated, the steering wheel should be placed directly in front of him. The operator normally faces the load end of the truck, and with both hands on the steering wheel it is natural for him to turn the wheel in the direction he wishes the truck to turn. This arrangement is similar to the conventional automobile steering pattern. For this reason, this type of wheel steer is known commonly as "automotive steer." It is preferred by 90 percent of operators. It generally is standard for all fork trucks provided with seats for the operator.

On truck models where the operator stands, however, the problem is reversed. The steering wheel usually is placed to the left of the operator and is provided with a hand grip. Since only one hand is used to steer this type of truck, an entirely different sense of "instinctive feeling" is involved. The tendency of 90 percent of operators is to turn the steering wheel in a direction reversed from that

(Continued on page 108)

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MODERN ELECTRIC INDUSTRIAL TRUCKS POWERED BY COST- SAVING PHILCO "THIRTY" STORAGE BATTERIES

Now you can get the kind of industrial trucks experience has proved the safest, most flexible and maintenance-free—ELECTRIC TRUCKS! And you can power your trucks with the greatest materials handling development since the fork-lift truck, itself—PHILCO "THIRTY", the Storage Battery with 30% longer life! Plan now for the big demands increasing production will place on your materials handling equipment. Philco "Thirty" will give your trucks top capacity, *plus* savings in maintenance, depreciation and replacements. Write today for new catalogs giving specifications.

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Chicago's Package Car System



The so-called package car system was initiated by the Chicago Assn. of Commerce in 1906 and has been maintained continuously since. Its purpose is to cooperate with all transportation agencies to help them provide Chicago shippers of merchandise with the most expeditious services available.

By A. H. SCHWIERTERT

*Traffic Director
Chicago Assn. of Commerce*

IN THE office of the transportation department, Chicago Assn. of Commerce, two girls are kept busy constantly in compiling the complete "performance records" of the hundreds of railroad package cars which are forwarded daily out of Chicago. This includes the exact time when each car arrives either at its terminal or break-bulk destination, and also the exact time when it had been "placed" for unloading.

These carefully compiled records are an essential part of the so-called "package car system" which was initiated by the Chicago Assn. of Commerce in 1906, and which has been maintained continuously since that date. The purpose of the system is to cooperate with all the transportation agencies to provide Chicago shippers of merchandise with the most expeditious services available for the distribu-

tion of their goods. Of primary benefit, however, is the economy resulting both to shippers and carriers by the elimination of unnecessary transfers and handling enroute, with proportionate decreases in loss and damage claims and delays.

Regardless of the recent war-emergency rail shipping restrictions, our reports show that merchandise package cars now are available to Chicago shippers, either for departure daily or on regularly scheduled days through the week, to more than 450 different terminal or break-bulk shipping points in 46 different states, the District of Columbia and Canada. During the year 1945, a total of 320,040 package cars were forwarded from Chicago, with an estimated tonnage of 3,850,000.

An essential part of our package-car service has been the quar-

terly publication of the "Way to Ship" which is our package car service bulletin showing package car routes, schedules and actual performance. In it are listed all of the destinations or break-bulk points in the United States and Canada having direct through package car services. Only the most direct or expeditious rail shipping line or lines are suggested. For example, for such shipping points as several of the largest cities in Texas, a large number of possible combination connecting-line rail shipping routes can be made up. However, the "Way to Ship" bulletin has reduced all of these many possibilities in Chicago-to-Texas package-car routes to only two "most expeditious" routes to Amarillo, two to Dallas, two to El Paso, two to Fort Worth, four to Houston, one to Lubbock one to San Antonio, and one to Temple.

For each package-car that is listed, the Bulletin tabulates the following different points of specific information: route or routes; special extra "reference" information when needed; "time schedule in days"; "number of cars reported" (at destination, and including the following required details: "total number", "unloaded on time", "unloaded one day late", "unloaded two days late or over".)

The Association policy of listing only the "most expeditious" package-car rail routes has been a very important factor in encouraging different railroad lines operating

from Chicago to establish new and improved package-car service for shippers. This policy, consistently carried through year after year has helped to build up and protect the tonnage of a package car route when once established by a carrier.

To aid Chicago shippers in making contacts with the rail carriers, included in the package car bulletin "Way to Ship" is a list of the 24 Chicago District freight stations where the different line-haul carriers accept freight for package-car loading. The listing includes the name of the railroad, location, telephone, and name of agent.

In the "reference" column which tabulates shipping information about each of the "destination" points listed in the bulletin, there is specific information, through symbols which refer to footnotes, about operating details. Example items are: "refrigerator only"; "through cars leave Chicago, Tues., Thurs., and Sat."; "through cars leave Chicago Fr. only"; "transfer house operated on Sundays but not on Mondays"; "daily motor truck service," etc.

The column in the Bulletin which indicates the "time schedule in days" for each shipping terminal, shows that there is "one day" package-car service for practically all Illinois destinations; and also for most destinations in the adjoining states of Indiana, Iowa, Michigan and Wisconsin. Also, some of the rail lines have made a specialty of "one day" package-car service even into more distant cities such as Kansas City, Cincinnati and Cleveland, Des Moines, Louisville, and Memphis.

It may be assumed, of course, that the increasing competition of highway trucking during recent years, and the increasing mileage radius out from Chicago to which trucks have been giving "overnight" trucking deliveries, also have been an influence in stimulating the railroads to extend and improve package-car services.

It was to be expected that the recent war-emergency shipping pressure on the railroads would result in many changes in Chicago package-car schedules and services. War conditions required first, full

(Continued on page 103)

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GENERAL INDUSTRIAL PNEUMATICS
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2 Generals move loads easier, over rough, smooth or soft surfaces...stop spillage, breakage.



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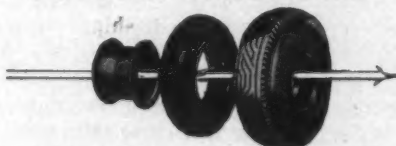


4 Generals end excessive floor wear... do not cut asphalt, linoleum — cannot cut or chip.



5 Generals reduce maintenance... handtrucks and cargo wagons stay in service.

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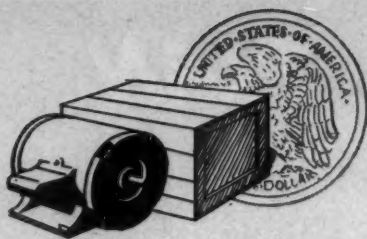
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With so many factors involved, there are numerous channels for monetary loss in any company which fails to realize the need of careful and constant review of materials handling operations and equipment.

TRAFFIC and HANDLING

WIDESPREAD publicity has been given recently to a survey by the Twentieth Century Fund in which it is stated that "59c out of every consumer dollar goes to cover the costs of distribution." This statement was seriously questioned, and rightly so, in an editorial appearing in the March, 1946, issue of *DISTRIBUTION AGE*.

As pointed out in the editorial, there is no existing standard method of ascertaining distribution costs. Until a way is found, general declarations as to costs will be misleading, especially when attempting to adapt them to an individual establishment. Every company, and every industry, must compile costs based on uniform units and terms. Correlation, coordination, and cooperation are needed before a uniform figure of distribution cost can be determined.

In this article it is not our intention to delve into the fine points of cost accounting. Instead we wish to direct attention to the subject of materials handling in relation to traffic management. But the factor of cost cannot be ignored.

There can be no question as to materials handling creating expense in any given company, and in industry and commerce at large. It is obvious that this charge is a part of the overall cost of distribution. Furthermore, materials handling begins with the movement of raw materials at point of origin and, of necessity, is a part of every phase of production and distribution until the finished pro-

By HENRY G. ELWELL

Traffic Consultant

ducts are delivered to the ultimate consumers or users. There is no escape from "materials handling," but there can be reduction and control of cost in the handling of materials.

Materials handling is involved in the receiving of materials and supplies; in the production line; in the shipping of products; in loading and stowing; in warehousing; and in a diversity of operations.

Definitions

There may be other definitions, but from the traffic department standpoint materials handling embraces the moving of materials, supplies, and products, which may be in bulk or in containers, in any form, weight, or size. In a sense, it is transportation (movement) within, or at, plants, warehouses, freight stations, piers, etc. Generally it applies to movements entailing comparatively short distances. The facilities for moving may be hand labor, hand trucks, power trucks, conveyors, or anything capable of being used to shift, lift or carry an object from one point to another. Even motor trucks, usually operated on public highways, may be used in materials handling work at a plant. Small cars running on narrow gauge tracks within a factory yard

or building may be classed as materials handling facilities.

With such a wide scope many potential reductions in cost are open for investigation. Moreover, it should be evident that with so many factors involved, there are numerous channels for monetary loss in any company which fails to comprehend the need of careful and constant review of materials handling operations and equipment.

In certain circumstances, a single company will find it difficult, if not impossible, to bring about progressive changes. Outside agencies are involved. Research and consultation with customers etc., is necessary before an individual concern can obtain the full benefits of an adjustment. Take the use of pallets for cased goods. To secure the greatest possible advantage, combined action must be taken. Right now such a move is under way.

The Grocery Pallet Committee of the Division of Simplified Practice, National Bureau of Standards, is studying two standard sizes of pallets i. e., a pallet measuring 32 by 40 in., and one of 40 by 48 in. At the request of grocery wholesaling and processing industries this project was undertaken by the division. The railroads and the motor truck operators also are represented. Traffic departments are vitally interested.

Under present methods, pallets of various sizes are used, but are not forwarded by shippers to consignees, except by a very few companies. The current practice

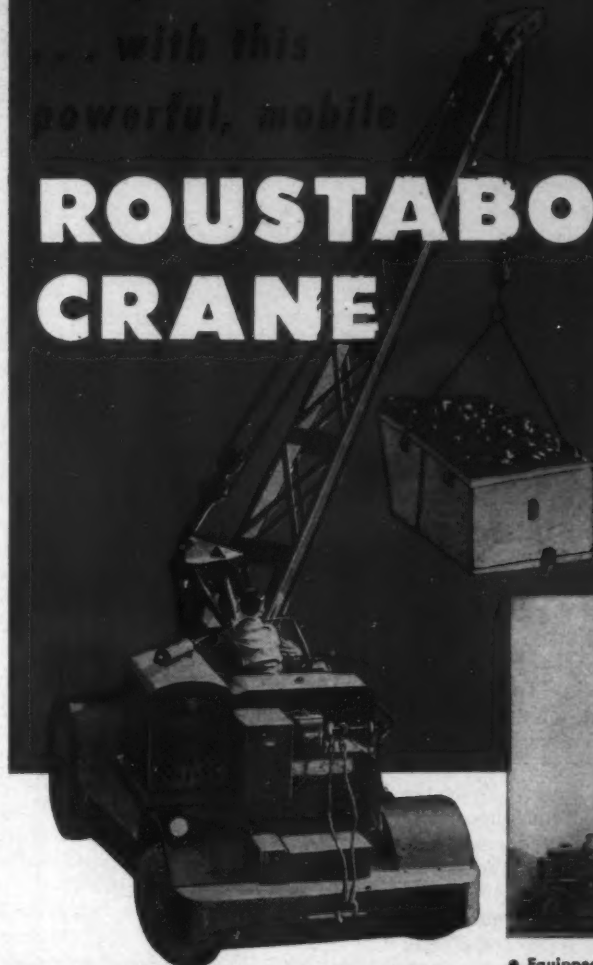
when a shipper loads a motor truck or freight car is to move the packages, piled on pallets, from the stock or shipping floor. The cases are then transferred by hand to the car or truck. Upon arrival the consignee then transfers the cases by hand to pallets. In other words, the receiver repeats in reverse the entire handling performed by the shipper. It would be far less costly, and much more efficient, if a shipper placed the pallets, piled with cases, directly into a freight car or motor truck, and a consignee removed the loaded pallets directly to his stock room, later returning or interchanging the empty pallets. If standardization of pallets can be accomplished, and a plan worked out for the return of interchange pallets between shippers, consignees, and carriers, considerable saving in cost will be achieved in materials handling. This will be reflected in overall distribution costs.

In these things, whether in organized or individual company examination of materials handling, traffic management has a vital place. Of all the divisions of a company the production department probably is the one most affected. It has the responsibility of maintaining practical materials handling performances and of obtaining proper types of equipment, especially when it has supervision of receiving and shipping. At the same time, the traffic department, because its functions relate to all forms of transportation, which includes materials handling, is concerned and should be consulted.

In the case of a manufacturing organization, materials handling operations range from the receipt of materials, yes, even prior to actual delivery insofar as planning is concerned, on through the stock room to production, to the handling of finished stocks, and finally to the shipping of the product. In many factories, materials handling comes directly under the production department, both as to receiving and shipping, as well as to actual manufacturing. In others, the receiving and shipping services are guided by the traffic department. Where the production department has the authority in

faster, lower-cost movement of everything around your place . . . with this powerful, mobile

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directing shipping and receiving, it should have the cooperation of the traffic department. For example, the production department will find the traffic department of invaluable aid in working out and maintaining a plan for the placement of freight cars at designated places at the plant to avoid unnecessary handling of materials and products.

In the selection of materials handling instruments the traffic department can be of assistance to the production department. At one company the production department was unloading not more than two cars daily of a certain raw material. Hand trucks were being used in unloading the freight cars. Heavy demurrage charges constantly accrued because the daily unloading of cars could not keep pace with the number delivered by the railroad.

Demurrage

The manager of the production department and the traffic manager worked together on a survey of floor space, maximum height of piles of material, number of freight cars and tonnage of material received daily. The traffic manager then consulted a materials handling engineer. With the combined efforts of the three, production manager, traffic manager, and engineer, piling of materials was rearranged. An electric powered truck was recommended and purchased to replace the hand trucks. Result: The daily unloading of freight cars was increased from two to eight; demurrage charges were abolished, and materials handling labor costs per ton were reduced.

It should be appreciated, though, that traffic managers, generally, neither are materials handling engineers nor specialized production managers. They do not have the required engineering or manufacturing training. Likewise, materials handling experts or production department superintendents, cannot direct traffic matters efficiently because their experience has been gained in different vocations.

Matthew W. Potts, well known pioneer materials handling consultant, has stated in this maga-

zine (Sept., 1939) that the "traffic department should not burden itself with engineering details involved in the construction of equipment, buildings, and the layout of machinery, but should act more in an advisory capacity with the idea of bringing about the proper coordination of all departments so as to effect the most simple and, at the same time, comprehensive system for handling materials." That principle applies equally to materials handling and to the three items he specifically mentions.

As an illustration of the traffic department's position in such matters we refer to a situation which developed, prior to World War 2 in a New Jersey manufacturing plant, because of increased production. Storage and shipping space were cramped. Modern materials handling equipment could not be operated because of inadequate "headroom" in the building used for storage and shipping. The contrivance for unloading and loading motor trucks was antiquated. The private side-track of the company was in poor condition and insufficient in size to accommodate the number of freight cars necessary for prompt unloading and loading of inbound materials and outbound products.

The traffic department made an analysis and then recommended that additional storage and shipping space should be provided by the construction of a warehouse to be connected with the existing building; that modern materials handling machinery, including a conveyor, should be purchased for use in the proposed extension; that the facilities, and space, for unloading and loading motor trucks should be brought up-to-date; that

the side-track should be enlarged and extended to furnish additional trackage for the number of freight cars required for receiving and shipping; that unloading and loading platforms for motor trucks and freight cars should be built or rebuilt to provide for a standard height.

The recommendations of the traffic department (astounding as it may seem to some traffic managers) were adopted and the needed improvements were made. As a result, cost of overtime for labor, which had been extremely high, was entirely eliminated; inbound materials were unloaded and stored more quickly; the heavier tonnage of shipments, caused by higher production, was easily handled by the shipping department; goods moved out promptly to customers, thus doing away with complaints. From the reduction in costs the project paid for itself, including accrued depreciation on the building, within six months, and, in addition, there was an increase in efficiency all along the line.

Engineering

In the account just cited the traffic department did not attempt to invade the field of engineering. It explored a situation; it presented a report; and it made suggestions laid down in broad, general terms. When the proposals were approved the traffic department cooperated with all of the interested departments in coordinating efforts. The actual planning of the building, the selection of equipment, etc., were done by the engineering and materials handling divisions. This, we believe, illustrates the basic principle of action outlined by Mr. Potts in the quotation we have given above.

We do not mean to imply that the traffic department can neglect the study of materials handling, or ignore the function as applied to the selection of appliances. On the contrary, the department must be prepared to investigate materials handling methods and to check into various types of equipment. The department should be familiar with the materials handling problems of its company.

Costs Cut 50 Per Cent

The fork truck has slashed handling costs by 50 percent at the Brooklyn, N. Y. warehouses of Bowne-Morton Stores, Inc., announced Towmotor Corp. recently.

Bowne-Morton purchased two fork trucks in 1944 which have been in use continuously for as long as 16 hr. a day, six days a week, carrying, stacking and loading such bulky materials as crude rubber, drums of oil, reels of cable, boxes of canned goods, bags of spices, cocoa beans and coffee.

Handling Prospects

(Continued from page 31)

handling equipment, and yet the industry is unable to supply the demand. Most firms are endeavoring to produce standard units only and will not engineer special designs to meet special requirements at present. Some companies that formerly produced materials handling equipment changed to meet war demands, and will not re-enter the materials handling field as such, although some are expected to manufacture similar equipment.

Changes in design, developed to meet the demands of the armed forces, have brought about a rapid obsolescence of equipment that was used in industry before the war. Moreover, since this equipment was used 24 hours a day, with very little maintenance, it is going to be necessary to replace a considerable amount of it with more modern units. The use of new materials in the construction of conveyors, etc., may make it advisable to install new units rather than try to rebuild old systems. This is going to make for further demands on the manufacturers of new materials handling equipment.

The slowdown of production in all industry caused by labor adjustments means that time will be more important in the future, in order to recover the loss of production. It will be necessary to increase or speed up production and one way to accomplish this is with better materials handling methods.

It has been found that many little industrial plants, who formerly felt that they could not afford materials handling equipment, have come to realize now that they cannot afford to be without it, as it reduces the time required for handling in a number of operations. Where formerly, men were available to assist in moving materials, they are now required for production operations. To take them from a production operation in order to move materials from one machine to another, or for the lifting of heavy loads to machines, or from the loading of cars, trucks, etc., is more expensive, because of the

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- Treats the fundamentals of materials handling rather than specialized applications and technical details.
- Discusses the usual application of such equipment rather than the unusual.
- Utilizes standard nomenclature rather than the vague variety of trade names and colloquial terms.

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loss in production time, than would be the cost of the proper materials handling equipment, even though it is used irregularly only.

The lag in the building industry brought about by government freezes on building materials, has placed a premium on space, and one way to gain space quickly is to use the cubic capacity of warehouses, or in the case of production plants, especially if continuous operations are performed, the installation of overhead conveyors, monorails, electric hoists, etc., permits the use of ceiling for transportation and conserves the floor areas for production operations.

A recent survey has shown that men returning from the armed forces have become materials handling conscious, because their main problem in the armed service forces (other than combat troops) was one of distribution of supplies. Our success in winning the war was our system of distribution in spite of its many faults. We had the best mechanical equipment for handling materials from the raw state, through production into warehouses, through storage and distribution reconsignment depots, aboard ship, at redistribution areas all over the world, and at advance bases supporting the troops on the firing line. Without mechanical materials handling equipment, the

Magnesium

Keen Mfg. Corp., Flat Rock, Mich., recently has begun production of a new lightweight home delivery appliance mover constructed entirely of magnesium. The new model weighs 27 lb. as compared with its steel predecessor of 58 lb.

volume of our own supplies and of our allies could not have been handled.

It took mechanical equipment to do the job, and it will take mechanical equipment in larger and larger volume to bring about better distribution of goods to meet our domestic needs, and the demands of foreign markets.

The amount of surplus materials handling equipment that will be made available to American industry will be relatively small if American industry is allowed to get into full production to meet the world's demand. The manufacture and distribution of consumers' goods and industrial products will be so great for the next few years that it will be necessary to use every possible mechanical device to reduce the time required for production and distribution.

Pallet Simplification

(Continued from page 42)

stated that his company was standardizing on the 40 by 48 in. size.

The traffic manager of one of the large canning organizations favored two sizes (dictated by the bay dimensions in his company's warehouse) viz., 40 by 60 in. and 50 by 60 in. The head of an efficiently operated wholesale grocery house in New York pointed out that his warehouse was using the 32 by 43 in. size for canned foods; and the 36 by 48 in. size for sugar. Those present at this meeting promised to gather additional information from their companies, and to submit their comments for further consideration.

In June, 1945, a meeting of the grocers' subcommittee on pallet simplification was held under the auspices of the National Bureau of Standards. At this time, definite suggestions as to pallet sizes were forthcoming. A sample survey, by no means comprehensive, listed approximately 80 sizes. After a careful study, two sizes were proposed in a circular letter to a selected group of wholesale grocers, food chains, and processors. For unit loads of 2000 lb. or less, the 32 by 40 in. pallet (2 or 4 way) was proposed, and for 3000 lb. or more, the 40 by 48 in. size (4 way) was suggested. The determining factors in arriving at these two proposed sizes were the inside widths of trucks and box cars and the widths of car doors. Experience of the army and navy indicated the desirability of a 96 in. overall width for carloading. Preliminary tests indicated that an 80 in. overall width for truck loading was desirable. The two pallet sizes proposed for adoption as standards: 32 by 40 in. and 40 by 48 in.; are adaptable both for box car and truck, since 96 is a multiple of the 32 in. and 48 in. dimensions, and 80 is a multiple of 40.

The capacity of the mechanical handling equipment of most independent grocers, 1500 to 2000 lbs., limits the pallet size to a maximum of approximately 32 by 40 in., according to army experience. This size is considered ade-

Rising Costs Affect Your Insurance

THE rising value of property requires more insurance, according to the Commerce & Industry Assn., of New York, Inc. High costs, rising values, and the lower purchasing power of the dollar are leaving properties without sufficient fire and other kinds of insurance, it is said.

"If a property is destroyed or badly damaged by fire, the replacement costs will be at current market prices. An insurance policy which is based on values considered adequate in Sept. 1939 should be increased from 27 percent to 60 percent, depending on locality and type of property, to bring it in line with present replacement costs.

"Fire insurance adjusters are discovering that because property is under-insured there is oftentimes not sufficient money recoverable to replace it. Most fire insurance policies are written on a three-year basis. Therefore, a policy purchased in 1939 would be renewed in 1942, and again in 1945. Unless, on one of these renewal

dates, an increase was made in the amount of the insurance to correspond with the increased value of the property, the average assured has only enough insurance to cover 1939 values. Coinsurance requires adequate protection. Adequate insurance usually is needed even to cover partial losses because if the policy holder has not carried enough insurance to satisfy the coinsurance clause, he can only recover a portion of his loss.

"Under-insurance penalties apply with like force to every line of insurance. Jury awards are higher. Third party liability claims are being settled at levels as high as 50 percent above the pre-war norm. Thirty claims under burglary insurance policies, picked at random, showed the total property stolen exceeded \$100,000. The insurance company paid the full policy limit but because the owners had not carried enough insurance, they recovered less than \$50,000."

quate for a business volume up to \$5,000,000 a year.

With the 32 in. side open for fork entry, this pallet permits a much shorter selection line than is possible with greater widths. Aisle space is conserved by this pallet. Actual tests by wholesalers have indicated that 9 ft. aisles are adequate. Larger pallets require 11 ft. aisles.

The 40 by 48 in. pallet appears to be preferable to the 36 by 48 in. size which also was considered by the committee. The latter size utilizes less of the truck's full load width of 80 in. and furthermore, it holds only about 80 percent of the number of 10½ oz. and No. 2 food cans which size 40 by 48 in. accommodates.

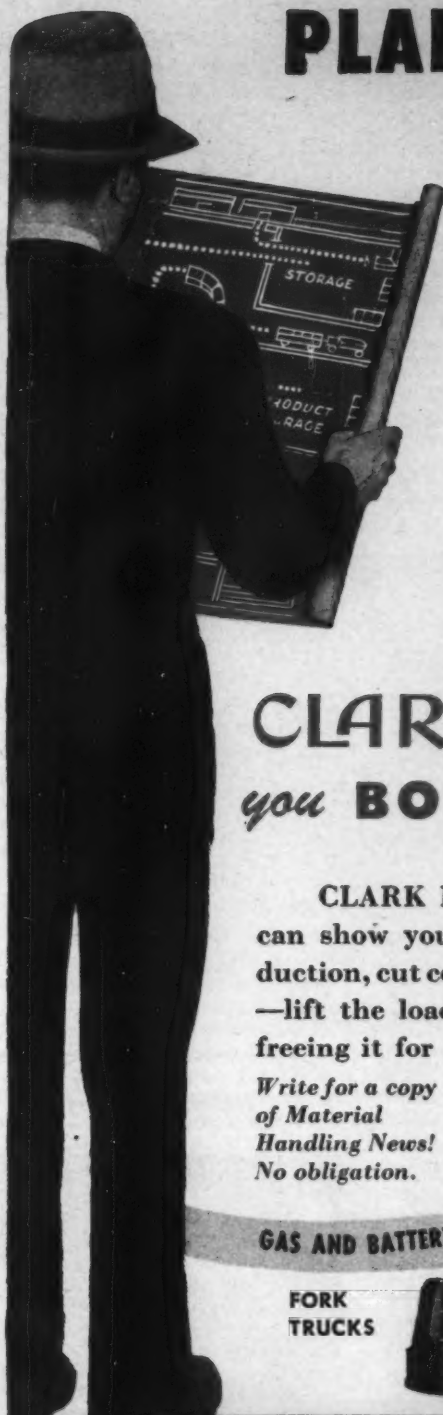
Selection of pallet sizes involves consideration of container sizes. Experiments have indicated that virtually all of the great variety of containers can be adapted to the two pallet sizes. A large proportion of food tonnage is carried in five sizes of cans. Preliminary studies indicate that the shipping containers for these five can sizes are adaptable to the two pallet sizes suggested as standards.

Large Pallets

A third and larger pallet may be necessary for the operation of chain store warehouses, and the size 38 by 54 in. (4 way) was suggested for consideration. The selection is in the hands of the chain store representatives on the committee.

One of the problems encountered in consummating this project has been the reluctance of some members of the industry to approve a simplified list of sizes as standards until there has been further experience with and wider use of pallets.

Another problem lies in the fact that a pallet size which may seem best for a given warehouse operation, considered separately and apart from any other factor in distribution, may not be adaptable for shipping. Conversely, a size best suited for use in shipping may not seem exactly the best size for every type of warehouse. Obviously, there must be a spirit of give and take in order to arrive at a size which is best both for ware-



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house and carrier considered together. The trend in modern materials handling is to design unit loads to fit truck and boxcar; the containers to fit the pallet unit load; and units of pack to fit the container. Designing shipping containers to fit a freight car, rather than to hold a given amount of goods, was a critical problem which was solved by the navy and army. There seems to be no good reason why industry cannot adopt this procedure, and make the contents "fit the container, which fits the pallet, which fits the boxcar or the truck."

Major factors tending to delay acceptance of simplified materials handling through palletization in-

volve the ownership of pallets, the freight rates charged thereon; accumulation of empties at unloading points and their return or exchange. Establishment of rental services as a private enterprise, and some adjustment in freight rates may solve some of these problems. Another solution may present itself in the development of an inexpensive one trip pallet, the cost of which could be absorbed as a packing charge. It is necessary for the common good to avoid selection of a "pet" size of pallet designed for a specific operator, but useless to outside supporting services. Factors to be considered in determining the proper size are:

1. Commodities and package size.
2. Sizes and weight of unit load, which determines truck size and capacity and which dictates the required aisle width.
3. Length of order assembly line.
4. Possibility of receiving and shipping by unit load.
5. Column spacing in the warehouse.

It has been predicted that in the not too distant future, practically all merchandise will be received by wholesale grocers in unit loads assembled at the plant of the processors, and that the unit load will not be broken until it is assembled into orders by the Wholesaler.

Human Equation

(Continued from page 36)

by the handling equipment foreman, or it may even go higher to short-sighted policy of management. For example, where management refuses to replace or properly maintain worn, dangerous, outmoded equipment, a higher percentage of damage may be expected.

Where machinery and equipment is called upon to handle loads up to and beyond maximum capacities established by the equipment manufacturer, we can expect tipped loads and impact drops. Unrepaired holes in platforms or floors have been permitted for years to take their toll of jostled cargo.

Perhaps one of the greatest causes of misuse of materials handling equipment, attributable to supervision, is the temptation under pressure of business, to persuade operators to continue to load or discharge cargo on overtime to a point beyond the capacity and endurance of human limitations. Man is no automaton. An operator worn with a day's fatigue, is no one to entrust with materials handling.

Finally, the responsibility for fundamental errors in industrial engineering which result in weak-

ened cargo containers must revert back to management. Certainly, carelessness of workers cannot be blamed if a stationary conveyor is at such an angle as to cause wracking and splitting of the boxes.

Doorways, corners and posts marred from repeated collisions of trailers may be as much the fault of the architect as of the operating personnel.

Handling Glass



Sheets of polished plate glass represent one of the most difficult handling problems. Now, however, sheets in sizes up to 7 by 12 ft. in unit loads averaging eight net tons may be transported by low lift platform trucks. These sheets are lifted from polishing tables by overhead hoists and placed on edge on each side of A-frames, leaning toward each other at the apex. Slips of paper space them far enough apart to protect them from abrasion.

Loading Costs

(Continued from page 56)

just behind the left rear wheel. There is only a protrusion of a few inches through the floor of the trailer, enough to allow the cable to work freely up through the trailer floor. The cable is so placed that it can be extended from the inside of the trailer body, directly out through the open side door, and down the length of the loading ramp to ground level, where the load is attached. Also, slung under the trailer body, just underneath the side door, there is a box containing the moveable hand control switch box and extension wire.

The tractor unit is a White WA 22. The trailer is specially built by Yankee Motor Bodies Corp., Los Angeles. It is 32 ft. long, 9½ ft. wide and 8 ft. high. Sheet cork, 2 in. thick, has been used for insulation to keep the bread warm while in transit. Special rolling racks were built to conform with the dimensions of the trailer body. Each rack holds 32 of the 40 lb. trays of bread. A full load consists of 12 of these racks, giving an increase of about 1,000 loaves. Overall cost of winch, racks and trailer was approximately \$3000.

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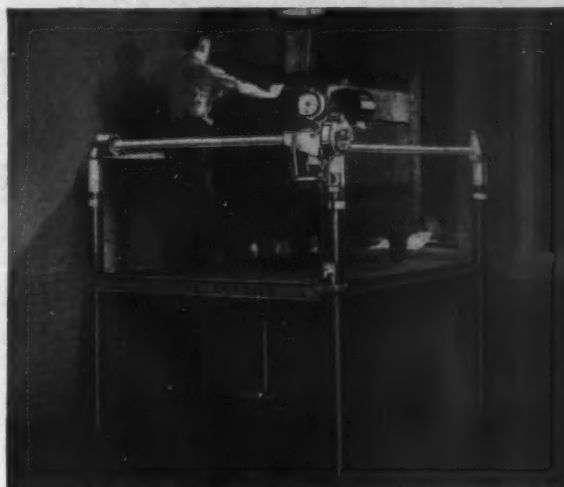
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Inside view of reefer barge's wooden deckhouse, looking forward in direction of midship transverse bulkhead. Note tramrail and switch.

Electrified monorail trolley equipment may be adapted to general cargo handling service on freight vessels of all sizes, including the largest seagoing ships.

Monorail Cargo Handling For Freighters

THIS type of equipment was first adapted to marine use on concrete barges built for the army. Of the 25 barges so equipped, 22 were intended for general cargo, and three were refrigerated. The three reefer barges were provided with a small upper deckhouse, standing on the forward end of the main deck house and serving as living accommodations for a small crew. The ar-

By **NEIL B. MUSSER**

Naval Architect

*Spencer & Morris, Inc.
Los Angeles*

range of main deck hatches and the details of the main deck house doors, bulkheads, etc., were somewhat different on the freighters and reefers, but these differ-

ences were not significant in connection with the cargo handling system provided.

The monorail trolley system, was manufactured and installed by Spencer & Morris, Inc., Los Angeles. Hangers attached to the ship's structure were installed by shipyard workmen under the direct supervision of the manufacturers' field superintendent. Ex-
(Continued on page 94)

Reefer barge at builder's dock. Note hinged jib booms over side cargo doors. Cargo hatches on top of house are located over deck hatches.





A DC-4 transport, with belly compartment, is used for combined passenger-cargo trips.

Improved Air Cargo Techniques

By G. L. KNIGHT, JR.

Cargo Manager
Eastern Air Lines
New York City
Formerly Asst. Director
Priorities and Traffic
Air Transport Command, Newark

PART 2

The time appears to be ripe, in Mr. Knight's opinion, for an enterprising and soundly financed organization to sell the airlines on the proposition that ground handling of air cargo can be accomplished best through an independent company working for all air carriers.

THE day will come when the airlines will need terminals equipped to handle freight and express exclusively. These terminals could be operated for all the airlines by a separate company. The airlines will find this method more economical than the development of individual ground handling units. Such units, because of duplication of manpower and equipment at stations serviced by more than one airline, would be tremendously costly.

Several recent magazine articles have pointed out the possibility of joint air freight terminals and ground handling facilities for contract air carriers, as a natural result of increased volume and as a necessary adjunct to air freight handling. C. R. Smith, in his *Saturday Evening Post* article, "What We Need Is a Good Three Cent

Airline," depicted economies of this nature as applied to the passenger end of airline business. He pointed out that numerous pieces of equipment are operated by each airline at principal airports all over the country. If this equipment were operated for the same airlines by one organization, considerable economies would result.

A look at this country's principal airports will reveal practically no satisfactory space in use at present by any of the airlines for load assembly and distribution. In most instances, as at La Guardia Airport, New York, this space consists of what would ordinarily be a small ramp office, or a room in the administration building, or even of a few square feet of hangar space, which is watched carefully by maintenance personnel to see that no further encroachment

is attempted. These facilities have been crowded and inadequate for some time, and at best are temporary expedients, even for those airlines handling air express only. Sooner or later, as shipping by air increases, these makeshift facilities will have to be supplanted by separate buildings apart from passenger operations. This will mean either many small buildings, or one large terminal, out of which all airlines could operate individually. The latter certainly would be more practical, but it might produce arguments and disagreements among the participating carriers as to its construction, allotted space, and location.

It would seem far better for an enterprising, well organized, and well backed company, with faith in the future of air freight, to gamble a little on present small

volume, and to sell air carriers on the proposition that ground handling can be accomplished best by an independent organization.

At least two companies who have made a start at handling air freight for charter operators; one at Fresno, Cal., and another at Baltimore, Md. This is a natural beginning for such an organization, since a few of the larger charter operators probably handle more air freight now than all the airlines put together. As the airlines enter the picture to a greater extent, however, it should become increasingly apparent that such a ground handling organization will need the airline volume too, in order to make a profit.

Schedules

Because of scheduled operation by the airlines, and definite route stops, they would probably demand, and should have, preferential loading over non-scheduled carriers. But with efficient deployment of loading personnel to take advantage of gaps where no airline schedules conflict, this problem should be easy to work out. After determining which carriers are interested in a ground handling service, the next problem would be to find a good operating location, and either build an air freight terminal or find a suitable building on the airport involved. To the best of the writer's knowledge, there are few suitable buildings available at principal airports. Those that are suitable probably would be buildings used by the Air Transport Command during the war, such as the one at Newark Airport.

For handling air freight for the army, one of the best arrangements was that at Miami, where there were two small warehouses of about 50 by 100 ft. One warehouse was used for processing, repacking, and all other preparation of the freight before shipment. The other was used for storage of fully prepared and waybilled freight just prior to loading on planes. Loads were picked and set on floor loading diagrams as they would fit into the various sections of the plane. This had the advantage of keeping backlogs of processed and unprocessed freight separated.

Most commercial air freight terminals will use the same types of inside warehouse equipment as was used in the many domestic terminals of ATC. The fork truck can do nearly everything but place the freight on the pallet. As for other moving equipment, hand trucks, a few small four wheel dollies, and some three-sided small package bins, pallet size, should be enough. Heavy pallets, 4 by 6 ft., constructed with 1 by 6 in. boards, separated by 4 by 4 in. boards, were found to be efficient and long lasting by the writer. Repacking facilities such as ATC had in some of its terminals would not be necessary, but a few devices to make minor repairs on freight, such as steel strapping, gummed tape, and heavy paper are handy to have around. Other handy implements, found in nearly every warehouse, are the crowbar, single rollers, rope from 1/2 to 1 in., block and tackle, steel bridge plates for truck platform unloading, carpenter's tools, and a socket wrench for freight which must be bolted to the airplane floor.

A great variety of plane loading equipment was used by ATC. Some was good, some not so good, and some was built to operate in

Air Cargo Tariff

It appears that the scheduled airlines soon will come forth with a consolidated air cargo tariff. This tariff, however, will have to be passed upon by the Civil Aeronautics Board in order to relieve the carriers of possible liability under the anti-trust law.

A consolidated air cargo tariff within one cover certainly will be welcomed by shippers. Individual airline tariffs have been inconvenient to handle. The new tariff will make rates on interline through shipments easier to obtain. The airlines should also welcome such a tariff because of the possibility of effecting sizeable savings through joint publication of rates and elimination of duplicating traffic expenses.

This move by the airlines will not necessarily mean identical rates for all carriers. However, there certainly will be a continuance of the trend, observable for some time, toward tariff uniformity among individual scheduled carriers. For example TWA, United, American and Braniff already have adopted virtually the same pattern.

The consolidated tariff would abandon entirely the system of classification for air cargo on which earlier airline tariffs were based. Eventually, all airlines will have to establish some system of class rates for different commodities in justice to themselves and to shippers.—J. H. F.

particular localities under special conditions. Besides flat bed trucks, there were high-lift trucks, hydraulic and mechanical, and various other types of specialized and experimental equipment. In the writer's opinion, the best piece of all-around equipment was the fork truck, used with pallets.

Equipment

There were four main types of tie-down equipment used on ATC planes, either experimentally or standard. They were plain rope, nets, straps, and the Evans "sky-loader kit." For the first year of the war, rope was about the only thing available, and plenty of it was used. There was never much trouble about cargo being secure in the airplane, because most loaders made sure by tying hundreds of knots and by using plenty of rope. But when it came to unloading, much time was wasted untieing all the knots. To eliminate this waste of time, knives would appear, and there would be wholesale slashing of good rope. At the end of a transcontinental run, one plane had over 400 lb. of useless, slashed or worn rope in the tail compartment, not to mention the amount in use in the cabin. Such an occurrence easily could produce a dangerous overload.

Rope nets were an improvement, but were clumsy to handle. They had to be fastened securely in many places to prevent cargo from rising off the floor in rough air. They tend to stretch and to get out of shape easily. Some airlines still use them, and have probably made some improvements.

The next method consisted of many fabric belt straps, about 2 in. wide, similar to the passenger seat belt, connected to a line of sockets on the sides and floor of the airplane. Straps could be tightened by sliding buckles. In conjunction with this, aluminum bars, which fastened into the side and floor of the plane, were used to separate various sections of the load and to give support during take-off and landing strain. These could be placed anywhere on two levels, as close as 3 in. apart. This method was very simple and quick from the handling point of view,

(Continued on page 102)

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Air Cargo Stowage

(Continued from page 54)

used haphazardly, loses 25 percent of its length in knotting and 30 percent more in cutting and ravelling, besides adding useless cost and weight.

Because plane-loads vary widely in shape, volume and weight and

because planes are subject to more twists, turns and suddenly applied forces than any ship or railway car, several forms of tie-down devices have been developed. One form uses ropes. The other uses rods, beams, locks and

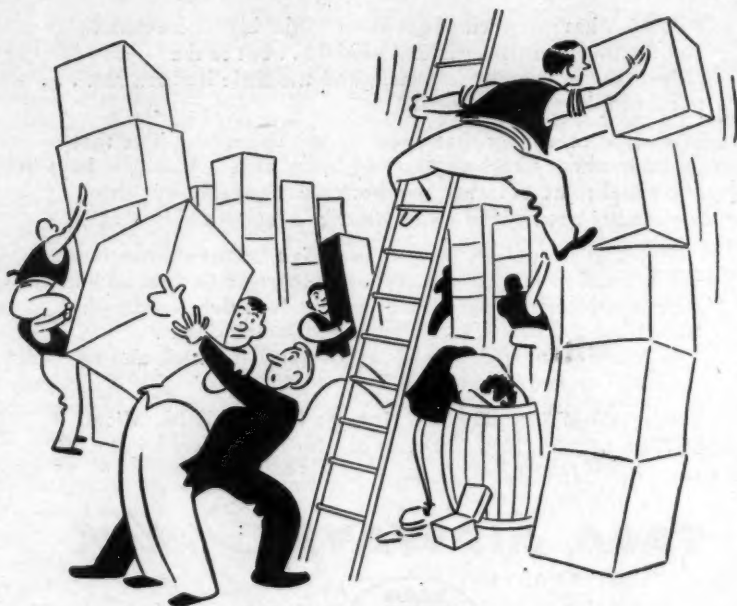
jacks. If ropes will not do the rods, beams, locks and jacks will. Though this sounds complicated, it actually is simple and inexpensive. Actual tests have shown that when the appropriate form of "skyloader" is used about 96 percent of normal damage can be prevented. The tremendous air cargo activities of the army and navy during the war stimulated the development of stowage devices which are now available for commercial use.

Another method developed by the airlines using planes with built-in cargo bins. Here the individual packages are not tied down, but the contents of each solidly filled bin is securely fastened in by means of a strap-net gate. In this way any movement of the cargo is definitely restricted. Airlines which have had experience with this method feel that, for regular air cargo service, individual package tie-down is not required; but rather that a restraining of the load should be used in order to limit the vertical and horizontal movement of cargo as much as possible. Nets in combination with bins do this very thing.

We hear a good deal about air cargo not needing as heavy packing or containers as freight shipped by ground carriers, and it must be admitted that the airlines have an enviable loss and damage record in handling air express. Damage to cargo, however, may take place because of improper handling or stowage most of which is preventable.

The more common causes of damage during plane loading and unloading are: (a) Careless sorting and piling. Either on the ramp or in the plane sorting and piling may be so carelessly handled as to cause damage. Cases may be sent crashing into one another, packages may be torn open by scraping against projections, and fragile shipments may be crushed and broken by piling heavier goods on top. (b) Weather. Proper protection from the weather must be given to air cargo being transferred from plane to plane or from cargo shed to plane.

2. STOWAGE SO AS TO MAKE THE



It's only a habit—

LARGE INVENTORIES TO MAKE SALES



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BRANIFF Air-FREIGHT

Phone Braniff Airways office at any city shown on this map, or write Braniff Airways General Traffic Office, Love Field, Dallas 9, Texas.

BEST USE OF SPACE. An important stowage problem is how to use in the most practical manner all the space available. In other words, stowage should be planned so as to have as little waste space as possible. The spaces that, unless careful planning is practiced, are usually "lost" or unoccupied in a cargo plane include: (a) The space between and around packages or containers. (b) The space occupied by tie-down apparatus or bin partitions. (c) The space at the sides, ends, and on top of cargo.

Much lost space, valuable to the carrier from a revenue standpoint, can be eliminated through careful planning and attention to compactness of stowage. For example, it is fairly easy to stow square or rectangular shipping containers compactly. Even in stowing articles that are not rectangular or square in shape, it generally is possible to arrange the units in such a manner that space will be economized.

There are three methods that might be employed to reduce the amount of lost space: (a) Plan stowage carefully in advance (when this is possible) so that the tiers of packages will fit the plane dimensions and large vacancies will not occur. (b) Stow each tier or row, particularly in cargo bins, so that broken stowage between units is reduced to a minimum. (c) Fill in as many broken stowage spaces as possible with other shipments of smaller size.

3. GROUND TIME AND LABOR COSTS. Cargo plane loading problems cannot be answered entirely by developing ground handling machinery, although much remains to be done in developing adequate fork and lift trucks, power belt conveyors and gravity type roller conveyors, and other types of materials handling equipment. Nor is the answer to be found by building materials handling equipment into the planes themselves. The answer probably is a combination both of ground materials handling devices and plane equipment.

The size, weight and quantity of air cargo influence airplane cargo door sizes, loading equipment and methods of handling. This analysis indicated that 84 per-

(Continued on page 146)

SPEED **GOES UP**



COST **COMES DOWN**

**with more
space available
to handle your shipments**

TWICE AS FAST! Yes, many Air Express shipments now travel at almost double former air-speeds — in the swift new planes now operated by the Airlines.

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MORE SPACE AVAILABLE — in bigger planes, in more planes. Service direct between all major U. S. towns and cities. Rapid air-rail schedules to and from 23,000 other communities in this country. Foreign service direct by air to and from scores of countries — the world's best service, in the world's best planes.

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AIR MILES	2 lbs.	5 lbs.	25 lbs.	40 lbs.	Over 40 lbs. Costs per lb.
149	\$1.00	\$1.00	\$1.00	\$1.33	3.07c
249	1.02	1.18	2.30	2.40	9.21c
349	1.07	1.42	2.84	6.14	15.35c
1049	1.17	1.98	7.40	12.20	20.70c
2249	1.45	3.52	17.45	28.24	70.61c
Over 2250	1.47	3.68	18.42	29.47	73.40c

INTERNATIONAL RATES ALSO REDUCED

WRITE TODAY for the Time and Rate Schedule on Air Express. It contains illuminating facts to help you solve many a shipping problem. Air Express Division, Railway Express Agency, 230 Park Avenue, New York 17, N. Y. Or ask for it at any Airline or Railway Express office.

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Representing the AIRLINES of the United States

Packaging And Materials Handling

The packaging engineer's responsibility does not end with packaging. He must envision the life history of a product as it moves from the packaging process to point of ultimate use. In this, the materials handling engineer can render valuable assistance.

TIME waits for no man. Eighty years ago the 2-wheeled hand truck had been improved to the point where it was universally used for the transportation of most all types of packaged material. Forty years ago, or thereabouts, power platform trucks were developed to supplement the hand truck and to transport materials in production and enroute from manufacturer to user.

With the power platform truck came the use of the skid, under which the platform ran to pick up and carry loads. Packaging then became an individual problem of the manufacturer who devised his packages to fit skids, skid containers or dimensional boxes. This type of power movement of packaged goods prevailed for some 20 odd years. Foremost in the build-

By EZRA W. CLARK

*Vice President and General Manager
Clark Trutractor Division
Clark Equipment Co.
Battle Creek, Mich.*

ing of power platform trucks were Yale and Towne, Elwell-Parker, Lakewood and perhaps one or two others—all of them battery-powered. Clark entered the platform truck field with a gas-powered model in 1920.

Mechanical handling of packaged material made rapid advances, especially after 1928 when Elwell-Parker of Cleveland and Clark Trutractor of Battle Creek

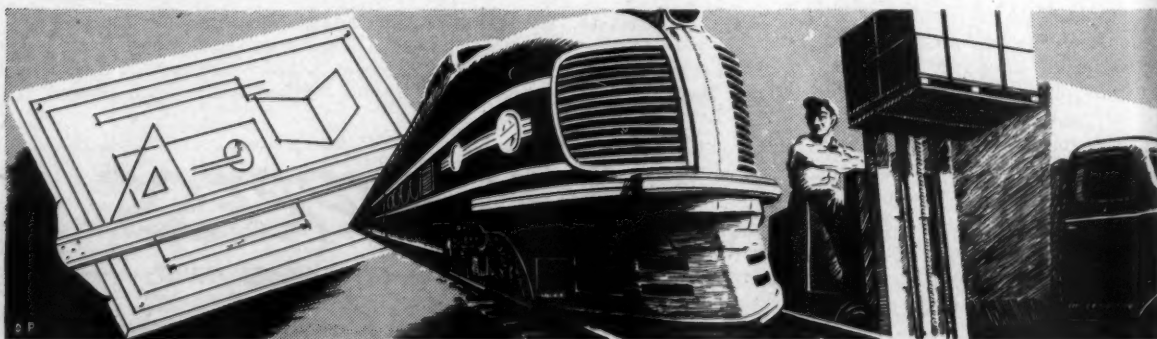
introduced the fork truck, Elwell-Parker a battery-powered unit and Clark a gas-powered unit.

Things began to happen in the materials handling field in the early 30s. The high skid with its wanton waste of space in storage and shipment was forced to give way to a low skid or pallet because the fork truck needed only three to five inches under-clearance as compared to the 11 in. or 15 in. necessary for the platform truck.

During the dark days of the depression, we had ample time to study materials handling problems and to devise new methods. The real value of a depression is the opportunity it gives for real thinking. With the cooperation of one of the larger automotive companies, we analyzed the flow of materials from source of origin to

(Continued on page 98)

This is part of a recent address delivered before the Industrial Packaging Engineers Assn. of America at Chicago.





Overhead chain conveyor at REA New York Assorting Station.

Scale equipped with rollers permits rapid weighing of containers.

10,000,000 Handlings a Day!

THE physical handling of shipments by Railway Express Agency is of a magnitude far greater than that of any other private transportation organization in the world. Movement may start with the pick-up, and include forwarding by rail, water, air or highway, and final delivery at destination. Each shipment by any of these routes must be handled a minimum of 12 times. Shipments which are transferred en route, pass through assorting stations in large cities, are forwarded in air express service, or are iced in transit require many additional handlings.

REA averages about 10,000,000 physical handlings of shipments a day. To accomplish this gigantic task, the agency has designed or adopted many devices which help speed the movement of this traffic. Some of the more widely used types of equipment will be of interest to those engaged in handling common carrier package traffic.

Approximately 48,000 industrial trucks with their various accessories are in daily use. These include 4-wheel platform trucks for hand or tractor operation, multiple-decked chain conveyor trucks, drop-frame trucks, fork trucks and hand and electric trucks. Pallets and

One of the most extensive handling problems in industry has been solved by Railway Express Agency, which handles each shipment it accepts a minimum of 12 times. Each day, employees of the agency accomplish an average of 10,000,000 physical handlings. This volume is made possible by the use of an integrated system of many types of mechanical materials handling equipment.

By C. G. PETERSON

Chief Engineer
Railway Express Agency



live skids are used to a limited extent.

Other equipment includes lightweight roller conveyors, overhead chain conveyors, and belt and live roller conveyors.

The lightweight roller conveyor is a development instituted by REA, and was first placed in service in May, 1938. As of Dec. 1945, about 3,705 sections, varying from 13 to 6 ft. in length, were in use.

The outstanding feature of these

magnesium alloy conveyors is that a 10 ft. section weighs about 70 lb. One man can carry it with ease. Sections may be coupled or linked, forming as long a length as necessary.

Gravity is the power used. A pitch of 5 in. to a 10 ft. section can move 2,000 packages an hour on a single conveyor width.

Roller conveyor "turns" are used in some express offices and terminals. These include 45, 60

and 90 deg. turns, with tapered rollers and guards to prevent packages from falling off.

In especially long runs of roller conveyors, to avoid the necessity of pushing the freight along because of insufficient incline, a system of booster belts is used. Booster belts can raise freight from 12 in. at the low end to 36 in. or 59 in. at the high end. There are couplings at the bottom and top ends of the belt frame that match standard roller conveyors. The shipments roll by gravity from the roller conveyors on to the booster belt, which is 20 in. wide, and made of 3-ply rufftop. A $\frac{3}{4}$ h.p. motor moves the belt 50 ft. a minute.

Live roller conveyors consist of regular rollers placed in a frame with a belt pressing against the underside, to make the rollers turn. Power is supplied by a $\frac{3}{4}$ h.p. motor. The advantage of live roller conveyors over belt conveyors is that the express assorter can stop a package on the live roller conveyor for marking, whereas on a belt conveyor, freight cannot be stopped.

Probably more reusable containers are utilized by REA than by any other common carrier. These containers have a spring steel frame to which is affixed a strong canvas bag forming the sides and bottom. Wood skids on the bottom facilitate handling on floors or on roller conveyors. It is provided with a plywood cover. It measures 13 cu. ft. and weighs 58 lb. Experiments have been conducted with a pliant balloon cover, which about doubles the capacity and decreases the empty weight.

The airborne container developed for expediting the handling of air express and air freight is of the same general design. However, it is provided with facilities which permit anchorage to the hold-down rings in the fuselage floor, and securing the lading firmly to the bottom of the containers even when volume does not reach the top of the rigid container frame.

The use of an overhead chain conveyor for handling shipments at common carrier terminals is comparatively new. The first overhead chain conveyor system was installed in the Inland Railway Express Terminal, New York, Feb. 1938. There are now 12 overhead

Efficiency



In temporary storage area alongside loading docks, fork truck permits pallet loads to be stacked to full height of the ceiling, thus greatly increasing storage capacity per square foot of floor area. The Reynolds aluminum pallet has ample bearing area to prevent crushing lower loads even when material is tiered to maximum heights.

chain conveyor systems in operation at express terminals in various cities. This type of system provides a means of moving shipments in a steady flow from the pick-up vehicles to the transfer vehicles, or directly to the railroad cars themselves.

Typical of the use of the chain conveyor system is the 11th Ave. assorting station, New York, which serves the garment center, perhaps the most congested shipping area in the country.

The terminal is of one floor construction, built around the conveyor system, and the operation is an assorting function, rather than a train loading operation. The building is 624 ft. long and 69 ft. wide. The depot's maintenance garage is housed in a separate building on the premises, and can service 300 trucks. The loading platforms are of saw-tooth design, having a 100 truck capacity for loading or unloading simultaneously. The dock doors are of metal, overhead type.

As for the chain conveyor system itself, the specially designed 4-wheeled trucks, propelled by an overhead endless chain, move

around an oval track at the rate of 125 ft. a minute. The trolley system covers 450 ft. of the platform. Portable sections of gravity roller conveyors, leading from motor vehicles at the docks to within a few feet of the central chain conveyor, serve as feed and discharge lines.

The remaining portion of the terminal is used as "open" area for handling large or bulky shipments which cannot be carried conveniently on the chain conveyor. In this area use is made of industrial trucks, gravity roller conveyors and other equipment.

Basically, the 11th Ave. terminal, like other express terminals, has two major functions.

1. **INBOUND TRAFFIC:** Shipments consigned for delivery within the boundaries of the 11th Ave. depot, are transferred to express trucks from the rail terminals. At 11th Ave., the shipments will be placed on the central conveyor system and assorted as to their particular routes. Regular routemen make the deliveries.

2. **OUTBOUND TRAFFIC:** All business receipted for, that is, collected on the routes by street motor vehicles within the 11th Ave. area, is brought to this station and assorted according to destination cities or routes by one of the 10 railroad terminals in New York.

To return to the mechanical operation of the overhead chain conveyor at the terminal, the system has 76 trucks, each 10 ft. long and equipped with three tiers or decks, each of which are further divided into bins by removable pipe sections or partitions. The width of the trucks is three feet. The top shelf is slightly over four feet above floor level.

There are two "breaks" at opposite ends of the conveyor system, separated by 38 trucks in each train. These are to permit entry of personnel with hand trucks within the floor area encircled by the moving trucks, without stopping the movement of the system. This area is used for temporary storage of express shipments.

Each bin of the truck is marked with a destination city or route. Packages put on the conveyor and then into these bins are assorted according to their destinations. The trucks are arranged in two car-

trains, each train bearing identical markings. An assorter need wait only 11 sec. to place a package on the proper bin if the one on the train before it is loaded to capacity.

The station, during the late afternoon and night, has two simultaneous operations; assorting shipments as they are unloaded from the pick-up trucks, and loading outbound shipments into trailers for transfer movement to the railroad stations. At either side of the terminal are stationed operators, who place shipments on the conveyor system on one side, and remove them at the other side, placing them on gravity rollers leading to motor vehicles parked at the loading docks. Other men stack the traffic into the motor vehicles.

A factor which contributes to the smoothness and efficiency of operation at this station is the absence of clerical detail. The pieces are counted into the outbound vehicles which are then locked and sealed (usually with a numbered seal).

The seal number and the number of pieces contained in the motor vehicle is sent to the rail terminal, thus eliminating further delays incident to record purposes.

With the present facility; the most modern in use by REA, about 20,000 packages an hour can be handled.

P. A. System

A two-way public address system has been installed in the Railway Express terminal, Long Island City, N. Y. This innovation is being used to facilitate the handling of from 90,000 to 120,000 packages of express every day, according to J. F. Ross, general manager, New York City department of the agency.

Foamglas

Thousands of square feet of the new vitreous insulation, Foamglas, are embedded in walls, floors, and ceilings of warehouses throughout the nation, according to Pittsburgh Corning Corp. It is claimed that this new inorganic insulation makes it possible to create and maintain proper temperatures and humidity, and to control the problem of condensation.



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Surplus Equipment

(Continued from page 33)

be short in the near future. In other surplus disposal, veterans have preference immediately after the federal government, and before states, cities, counties, or other political subdivisions, and public institutions. The Administrator, Maj. Gen. E. B. Gregory, has ruled that veterans have absolutely first preference in buying almost all tractors.

WAA Materials Handling Equipment Branch broadly classifies surplus now available as conveyor equipment, industrial cranes and hoists, ship yard cranes, industrial trucks and tractors, and mechanical powered transmission equipment.

In the conveyor bracket are included belt conveyors, screw conveyors, chain conveyors, roller conveyors, overhead conveyors, pneumatic conveyors, cable conveyors, bucket elevators, and miscellaneous conveyor equipment.

The crane group includes railroad locomotive and wrecking cranes, overhead travelling cranes, charging and manipulation cranes, Gantry cranes, Whirley ship cranes, jib cranes, ore bridges, hoists, and electrical and hand-powered hoists.

The industrial truck group, besides trucks, includes tractors, trailers, stackers, and mechanical accessories.

Among the mechanical powered transmission equipment are transmission belts, chain belts, passenger elevators, freight elevators, escalators, and similar equipment.

The lists mention fork trucks, pallets, and items industry will easily suggest to itself almost automatically. The Branch also disposes of scales, electro-plating equipment, anodizing equipment, parkerizing and bonderizing equipment, pickling machinery, vapor-degreasing machinery, alkaline washing and drying machinery, metal sprang equipment, and other items not strictly classified as materials handling equipment but allied with the general division.

The original value of the declared surplus industrial trucks group, over-all, is in excess of \$2,000,000; the value of the mechanical powered transmission items totals about the same. The government paid over \$12,000,000 for the Whirley cranes. These, and other ship cranes, and various marine handling equipment, unlike the other items in the list, are not urgently in demand. While the supply of almost all other equipment listed comes in the classification of critical, and is in urgent demand in this country, the items identified with shipyards and shipping so lack customers that WAA plans to make a regular sales campaign to sell them abroad. It is anticipated they will be

needed in the ports which have been devastated by the war. Most similar equipment in war torn countries was blasted out of existence. It also is expected that South American countries, now booming with exports, and live with shipping, will be ready customers for cranes and similar handling machinery.

There are 33 WAA offices scattered around the country. It is possible to locate one in almost every area or section. Those who desire to buy materials handling equipment are expected to negotiate with the officials in these offices. The machinery is disposed by WAA solely by means of negotiated sales. This means, obviously, the buyer makes a deal with the WAA agent. The various items for sale are cataloged.

Catalogs may be obtained, by those eligible to buy, at the 33 WAA offices. If the item desired by a potential purchaser is not in the immediate neighborhood, the local WAA office is supposed to query by teletype other centers where the equipment may be located. The various types of equipment are advertised in trade journals, newspapers, and every kind of publication that may reach the eyes of those interested.

In some instances the equipment is scheduled for display and examination at places and at times convenient to the buyer and to those who have used it. It has been found there is an extraordinary demand because manufacturers, who normally would make this type of equipment, have been restricted by lack of skilled labor, by scarcity of metals, by strikes, as well as by the need of many of other materials.

Transportation also has been a problem. The recent embargoes, stemming from the coal and rail strikes, which threatened to paralyze distribution of a majority of the products of our national economy, is expected to be repeated at more or less frequent intervals for the next 12 months or more. ODT is inclined to think that the violent interruption in production and distribution, and other interruptions which are threatened by strikes, plus the extraordinary demands from special and necessarily

(Continued on page 146)

No Crating



The Webb Slingabout is a tailor-made, heavily padded, water repellant, canvas jacket provided with an ingenious handhold sling for handling on and off of trucks and through narrow doors and passages. Specifically designed for the use of truckers, the Slingabout eliminates much of the usual costly crating of highly finished merchandise, such as refrigerators, water heaters, ranges, ironers and similar appliances. It is made by the Webb Mfg. Co., Philadelphia.

Reducing Expenditures In Public Warehouses

By JOHN D. SHEAHAN

*Secretary and Treasurer
Drake, Stevenson, Sheahan, Barclay,
Inc., Distribution and Materials Hand-
ling Consultants, New York*

IN an earlier article it was pointed out that a public warehouseman must offer his services to customers at a price less than it would cost them to do their own warehousing, or he may find himself without any business. A cost-conscious distributor will not buy a service which he can perform himself more efficiently and economically. Warehousing is an essential function in our economy, but whether it is performed by a public warehouseman or by a manufacturer for his own convenience depends on which method gives the best service at lowest cost.

Prospects for increased competition also have been discussed. Men who have gained storage experience while serving with the army or navy are returning to apply their training to commercial situations, and the more efficient handling methods developed during the war are being adopted by many who are engaged in storage operations, both public and private.

The public warehouseman who wants to hold his own against growing competition must reduce his costs. He must give his customers the quality of service they have a right to expect, but he must cut costs all along the line so that the service he sells will be the "best buy" for his customers. In the days to come, the efficient, low-cost operator will have an increasing competitive advantage.

It must be recognized that cost-cutting is a continuing process, not a single operation. The best operation today may be relatively inefficient tomorrow. A program for continual scrutiny of operations as they affect costs is essen-

tial for the warehouseman who wants to stay on top.

There are many possibilities for cost reduction in the average warehouse. The list which follows is by no means exhaustive. It is intended only to stimulate thought. Most warehousemen probably can find many others.

1. Planning. Unless a warehouseman plans his operations, he may find that no distinction is made between the more-important and the less-important work. Workers and equipment will back-track from one assignment to another, time will be wasted as they wait for new instructions, and it will be impossible to put just the right number of men and the right kind of equipment on each job. As a result, costs will be high.

The planning of operations, particularly those of the following day, is one of the most important factors in cost reduction. At a certain warehouse, customer merchandise was handled on a hit-or-miss basis. Working crews were continually being called off one job to assist in another which seemed more important at the moment. This condition was largely due to lack of advance notice from customers calling for goods. Warehouse managers had been drilled in the policy that in the warehouse business unlimited service must be given on a moment's notice.

In this particular case, the co-operation of trucking firms and customers was obtained so that notice is now given in advance on most calls for delivery. The warehouse is able to set up its operations on a scheduled basis on the

Points covered in this article include:

Planning

Preparation of outgoing shipments

Customer cooperation

Central control of labor and equipment

Billing operations

Overtime

Fitting equipment to needs

Preventive maintenance

Layout of space

Procedures

Paper work and records

Personnel administration



preceeding afternoon, carry out its work more efficiently. It gives better service to truckers and customers. The average turn-around time for trucks has been reduced from three hours to 30 minutes.

Whether the customer is sending his own trucks for pick ups or employing a contract carrier, time lost by the trucker at the loading dock is money out the window. In the first instance, the customer pays for the lost time, and in the second, the trucker either tries to recoup the loss through higher rates or is reluctant to call at an inefficient warehouse. In both cases, there will be waste, higher costs, and dissatisfaction, because of which the warehouseman may lose accounts without ever realizing why customers and truckers prefer to do business elsewhere.

A system for obtaining advance information on incoming shipments should also be set up, as a further aid to planning. This system will operate in much the same way as that for outgoing shipments.

In large companies, a daily meeting of responsible foremen and supervisors may be held so that these men can present their proposed work schedules for the following day and the warehouse manager can establish priorities for all work to be done. Allocation of labor and equipment is made at that time. Without such planning, management must take

workers from one job to accomplish another, leading to friction and inefficiency.

When operations are planned a day ahead, jobs, men, and equipment are kept in balance, and work goes forward steadily. That is why planning results in better utilization of manpower and machines, and lower costs.

2. Preparation of outgoing shipments. Strange as it may seem, many warehouses have no standard procedure for accumulating and holding shipments so that they can be located easily when the carrier is ready to be loaded. Time spent searching for loads is time and money wasted. Each outgoing shipment should be kept intact in a numbered bay, or otherwise marked or recorded, so that the loading crew knows exactly where it is.

Truck Docks

At one warehouse where truckers had had difficulty picking up their loads, this recommendation was made: "The truck dock should be cleared of all storage merchandise, excess skids, pallets, etc., and should be set up and marked as holding bays adjacent to each bank of elevators. Pallet racks should be set up within each bay to accommodate pallet loads of merchandise which cannot be tiered, so that all available space will be utilized. Every effort should be made to

schedule outbound loads in such manner that they can be set up prior to the arrival of trucks."

The results of adopting this recommendation have been that shipments are quickly located, delays have been eliminated, and operating costs have been lowered.

3. Customer cooperation. Many distributors follow practices which, unknown to them, are burdensome and costly to public warehouses. They usually are glad to give their cooperation when the facts are explained. Some customers bunch their orders and send them in irregularly, causing spurts and lags in operations, with overtime at one period and idle workers at others. Some customers submit unnecessary orders for very small lots, causing increased handling costs. If these matters are put up to him properly, however, the distributor can often relieve the warehouseman of both problems.

The public warehouseman should be looked on as an extension of the distributor's organization. In particular, the warehouseman should ask to be kept advised of the distributor's sales campaigns, so that plans can be laid to handle the expected increase of shipments. Cooperative effort in these matters will cut costs both for the warehouseman and his customer.

4. Central control of labor and equipment. Centralized control over labor and equipment permits rapid shifting of men and machines from one job to another. If planning were perfect, each foreman or crew leader could be given his work schedule for an entire day. Since not all work can be anticipated, however, there should be a control office which knows at all times where each crew is and what it is doing. When a crew finishes its assignment, the control office is in a position to dispatch these workers where they are most needed.

If, however, all labor and equipment are assigned permanently to specific warehouses or areas, those in a busy area will be overworked and behind schedule, while those in a slow area will be idle. Centralized control permits the transfer of crews to points of greatest activity. More work is completed, and the cost per unit is lowered.

5. Billing operations. Substan-

Expendable Pallet



A low cost expendable pallet, designed to effect economies in shipping, has been developed by Techtmann Industries, Milwaukee.

A 60 percent reduction in weight is achieved in this 4-way pallet by the use of a double corrugated board top supported on square or round wood blocks. Entire top and block ends are dipped in a water-resistant adhesive which seals off moisture from the load.

Loads up to 4,000 lbs. have been carried on the new pallet without failure. Tests further show that this pallet will survive a number of trips without appreciable damage under normal conditions of shipment by rail or truck. Maximum load storage is attained in the standard 42 by 48 in. size since multiples of these dimensions nearly equal the widths of truck and box car bodies.

tial savings can be made by simplifying billing and re-billing functions. Many companies receive a large number of special service invoices, some of them amounting to only a few cents. A customer may receive anywhere from 10 to 20 invoices each month. It is obvious that it would be advantageous both to the customer and to the warehouseman to consolidate these billings into one or two invoices a month. In some cases, the cost of preparing the statement exceeds the amount which is billed. Such practices add to costs both for warehouseman and customers.

6. Overtime. One of the most fruitful fields for money saving is a close control of all overtime work. In many warehouses, overtime has become almost routine, whereas actually it should be authorized only under extreme conditions. Overtime should not be permitted unless there is advance, written authorization, and authorization should not be given until after a request has been submitted showing the names of persons who are to work and the number of hours it will take to do the job. Adoption of this rule will result in substantial reductions in overtime payment with no deterioration of service to customers. Excessive overtime usually indicates poor administration, poor application of work procedures, or poor assignment of personnel during regular hours.

While a certain amount of overtime usually is passed on to the customer, it is inevitable that some of it must be absorbed by the warehouse. The analysis of one situation disclosed that less than five percent of overtime was entirely re-billable to the customer, and only about 25 percent was even partly re-billable.

7. Fitting equipment to needs. Some operators, impressed by the success of the armed forces in mechanizing their handling operations, but not acquainted with all the implications of mechanization, look on the fork-truck-and-pallet system as a cure-all for every handling problem. This attitude may lead to extremely unwise moves in the procurement of equipment.

To mechanize an operation prop-

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erly, three courses of action must be taken.

First, the entire operation should be reorganized so that the new equipment becomes an integral part of the operation. The simple addition of equipment with all other factors left unchanged probably will result in increased rather than decreased costs, since it is unlikely that efficiency will rise sufficiently to offset the outlay on the machines.

Second, equipment must be properly selected from the standpoint of work to be done. There are many kinds of materials handling equipment, and each is superior for some particular task. No one kind is best at everything.

Third, costs must be considered. Equipment represents an addition to fixed costs, in the form of capital and depreciation charges. The warehouseman who invests in equipment without carefully balancing equipment costs against the operational savings attributable to mechanization may be worse off with machines than without them.

What kinds and sizes of equipment should be bought and how this machinery should be geared in with manpower are decisions which must be made differently in every warehouse or company. There is no one right answer. The only criterion is, "Will the installation of this equipment reduce net costs?"

8. Preventive maintenance. Servicing or repairing a machine at a time when it should be at work is costly not only because the machine is not producing, but also because the crew to which it is normally assigned cannot function properly without its help. To minimize breakdowns, preventive maintenance should be scheduled, not left to chance. It should be done after hours, if possible, so that the work day is not interrupted. Inadequate battery charging equipment may be a particularly costly bottleneck.

9. Layout of space. The laying out of storage space requires real engineering talent. Each area presents its own problems, and the layout for it must be a tailor-made product. When space is laid out correctly, more goods can be stored, operations will be faster and operating costs lower.

The layout should be such that all supplies will be readily accessible. Moving one stack to get at another is a costly business. Supplies should be so stored that space can be freed, as goods are shipped, in relatively large blocks, which can then be used for storing incoming property. Space layout which results in the freeing of space by large blocks also results in faster and more economical operations. Space should be laid out so that supplies can move in a straight line from carrier to stack, or from stack to carrier. In warehousing as in transportation, backhauls are uneconomical.

10. Procedures. The army talks of "standing operating procedures." Industrial engineers speak of "methods" and "systems." Underlying these terms is a principle, the truth of which we all admit, namely, that there is one best way to perform every task, and if the task is repeated frequently, the one best way should be standardized, written down for all to see, and made compulsory.

How many men and how many machines should be assigned to un-

load a car filled with a particular item, how a certain size container should be stacked on a pallet, what size pallet should be used, how paper should flow, these and many other routine processes should be standardized. Trying to remember how a job was done before, or improvising a method instead of using the prescribed one is wasteful practice. Man-hour productivity rises when the best way is predetermined and followed, and when productivity rises, costs go down.

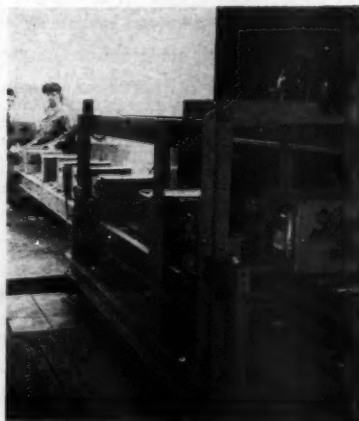
Savings can be realized immediately by tying this point in with planning. When notice is given that a car bearing a certain product is due the following day, the standard procedure for unloading the car should be given to the foreman whose crew is to do the unloading. He then not only has the right number of men and machines, but also detailed, written instructions on how his team is to operate.

11. Paper work and records. Some companies keep such inadequate files that they are sometimes financially penalized through not being able to produce necessary records. On the other hand, it costs money to fill out forms, and more money to file them. Paper work which is not absolutely essential to the functioning of a business should be ruthlessly cut out. Extra carbons and extra files are easy to start, costly to maintain, and will sap the firm's resources forever, unless someone who is honestly interested in cutting costs measures them by the only appropriate standard: "Are these extra copies and files absolutely essential to the operation of our business?"

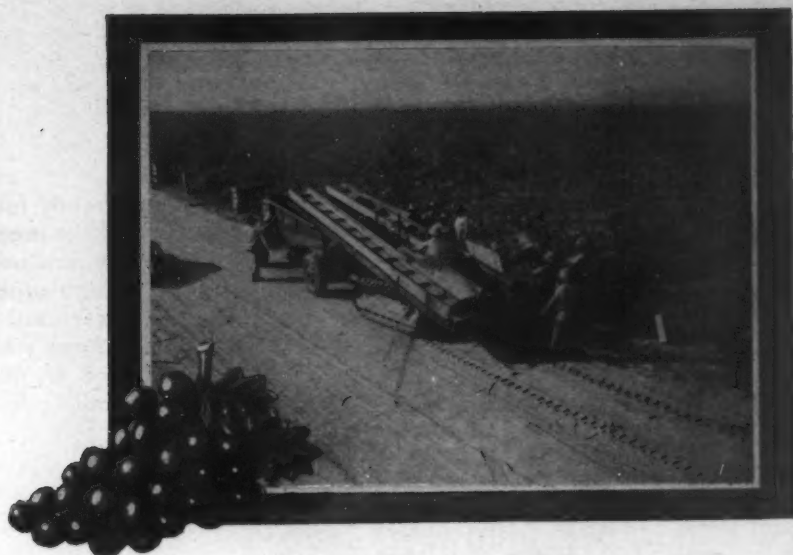
12. Personnel administration. Employee morale can be an important cost factor. Satisfied workers are usually more efficient. Out-of-date job ratings, inequitable pay, and bad working and sanitary conditions frequently are met within high-cost warehouses. Money judiciously spent in improving working and sanitary conditions will pay dividends in higher efficiency.

All workers should be trained in the plant's standard procedures, in basic work principles, and in correct machine operations.

"Projectoveyor"



Time for loading and unloading trucks has been reduced greatly by use of this cantilevered belt conveyor, which is projected into the trailer by one man, to any desired distance up to 19 ft. This power conveyor, which can operate in either direction, is always within hand reach of the man in the trailer. One man can unload 800 cases in 30 min.



The Wine Industry Tries Mechanical Handling

Mechanical grape loaders and unloaders long have been needed by California's wine industry. Although no enterprising materials handling equipment manufacturers seem to have thought of developing them, the wine industry itself has been attempting to fill the need by working out its own more or less homemade devices.

By ELSA GIDLOW

Special Correspondent

WINE making is one industry that does not boast of its modernization and mechanization. It is a field, one is tempted to say an art, where traditional methods generally are considered best, and where innovations are regarded sceptically. Though tradition and old methods may be respected in the making of wine, there are activities auxiliary to the process that vintners are beginning to think should be brought up to date. One of these is the handling of the grapes from vineyard to winery. As a result of studies and recommendations of

a sub-committee of the Wine Institute's technical committee, some interesting steps have been taken towards the mechanization of grape loading and unloading at California vineyards and wineries.

Motor trucks are used now instead of horses and wagons but apart from that concession to modernity, until two years ago, wine grapes were handled as they had

been for hundreds of years. Anyone who has visited a California vineyard in the vintage season has seen the pickers carry their boxes of grapes to the ends of the rows and stack them. Loaders then tossed the boxes to men waiting on dump trucks who emptied the grapes into the truck and returned the boxes. The pitching back and forth of the boxes might be considered as a skilled operation, but one with certain hazards in a period of green help and manpower shortages such as the war imposed.

Mechanical grape loaders and unloaders became virtually indispensable. Oddly enough, no enterprising materials handling manufacturer appears to have thought of developing them. Considering the size of the wine industry in California alone, it looks as if a good source of profit was ignored. During the past two years, the wine industry itself has been attempting to fill the need by work-

(Continued on page 94)



Currently four factors are outstanding: the proposed St. Lawrence seaway and power project, the supply of high-grade iron ore in the upper lakes area, the revival of trade in package freight, and the development of new methods of freight handling to reduce operating costs.

Traffic Factors on the Great Lakes

By ANNA KLINE

Cleveland Correspondent

FUTURE traffic on the Great Lakes, which reached record highs during the war years, will depend on many factors currently unpredictable, as well as on the development of new type vessels and new methods of freight handling to reduce costs, according to lake states transportation men.

Chief among the big questions at all lake ports is the future of the proposed Great Lakes-St. Lawrence seaway and power project now being considered in Congress. If this proposal is defeated at the current session, supporters do not plan to drop their long fight for its completion.

Another factor is the future supply of high-grade iron ore in the upper lakes area. This commodity accounted for the movement of almost 76,000,000 gross tons of bulk cargo in 1945, and a record high mark of 92,000,000 gross tons in 1942. The supply of iron ore, the leading article in Great Lakes commerce, may be exhausted, geologists say, and seriously affect the

economic future of the steel industry.

Package freight trade on the lakes, once a thriving industry speeded to its decline by World War II, may also be revived. Several firms are considering entering or returning to this field, hoping that faster vessels and present economic needs will provide means for more profitable operations.

Competition

Lake operators are not unaware of the increasing competition they will meet from other forms of transportation, including not only the railroads and motor carriers, but also from air-freighters.

Opinion as to the worth of the St. Lawrence-Great Lakes seaway proposal is divided even among officials of lake port cities. Though most of the cities on the lakes favor it, many officials and business interests in such ports as Cleveland, Buffalo, and Oswego are among its strongest opponents.

Competition from Canadian and European vessel-operators in overseas traffic is not the least of their reasons. The opposition is said to be spearheaded by public utility, railroad, and eastern seaboard interests who fear that approval of the project would have a direct bearing on their continued existence.

The wide differences in opinion on the economic results of the proposal is by no means limited to a sectional dispute, but is present in all sections of the country, as well as within many organizations representing diversified interests.*

The measure, which would open the Great Lakes to deep-sea ships and provide an abundance of electric power to New York and several New England states, has been before Congress intermittently since 1919. An international treaty to build the seaway was agreed upon by Canada and the United States during the Hoover administration, but Congress failed to ratify it. In 1934, the treaty failed to muster the necessary two-thirds vote in the Senate. The estimated cost is about \$550,000,000. Opponents, however, contend the project may cost more than a billion dollars of Canadian and American taxpayers' money.

Abandoning the treaty method,

*Anybody interested in obtaining material representing the opinions of the opponents of the St. Lawrence Seaway and power project may obtain it by writing to the National St. Lawrence Project Conference, 931 Seventeenth St. N.W., Washington 6, D. C.—The Editor.

the Roosevelt administration in 1941 attempted to get the project started through the agreement method. This would require approval by only a simple majority in both Houses, but the plan was halted by the war, and is only now being heard by a Senate foreign relations sub-committee.

To make the seaway navigable to ocean-going vessels, it will be necessary to dredge and deepen a stretch of about 100 miles in the International Rapids of the St. Lawrence River near Montreal, as well as a few smaller stretches in other parts of the route.

Among the arguments for the St. Lawrence-Great Lakes seaway is the need for another source of high-grade iron ore, when our own supplies, shipped down the lakes from Lake Superior docks, are exhausted. The ores of the Lake Superior region are not of unlimited supply.

Iron Ore

Dr. A. B. Parsons, secretary, American Institute of Mining and Metallurgical Engineers, recently estimated the life of the rich Mesabi Range in Minnesota as nearer 100 years than the eight years predicted in 1942, but admitted much of it would have to be treated, as the average content of the ore goes down. He supported the suggestion of A. R. Van Slyke last August, and of other experts before him, that half the higher grade ore of the Mesabi Range be set aside as a military reserve so it would be available in times of great need.

Since the Mesabi Range is the "real works" of the Lake Superior iron ore field, and the Lake Superior iron ore deposits are the foundation of America's steel industry, this problem is of fundamental importance. Recent statistics reveal a reserve for the whole Lake Superior district of 1,248,198,755 tons. If the extraction rate of the war years were to continue, the high-grade ore of the upper lakes region would be depleted before 1960. At an extraction rate of 50,000,000 tons per year, a modest estimate,

(Continued on page 109)

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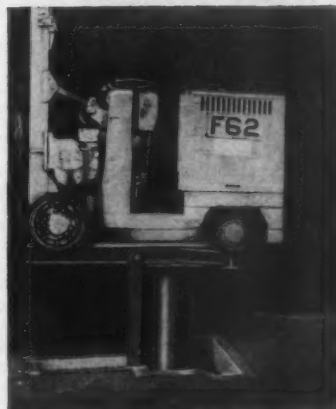
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NEXT MONTH in **DISTRIBUTION AGE**

THE August issue will be devoted chiefly to articles on the marketing of industrial products. Among the major subjects featured are:

SHORTAGES . . . Gravity of world shortages of raw materials, particularly lead, copper, zinc and tin, is emphasized in a special report by Arnold Kruckman based on a survey of government agencies.

PETROLEUM . . . Despite present handicaps the petroleum industry is facing the greatest demand for its products in the history of the nation, according to Joseph E. Keller, attorney, National Petroleum Assn.

TIRES . . . Trends in truck and industrial tire marketing are forecast in a special article by Joel Keith, associate editor, which emphasizes that marketing, in a highly competitive industry, cannot be effective unless the phases of distribution which precede it are efficient and economical.

SULPHUR . . . The basic factors in the distribution of sulphur are discussed by R. B. Johns, assistant vice president and sales manager, Freeport Sulphur Co.

COTTON . . . Recent developments and probabilities in the marketing of raw cotton are analyzed by D. J. Witherspoon, associate editor, in an overall article on cotton distribution.

STEEL . . . What can be accomplished through the use of lighter freight equipment built of high strength steel and how transportation costs are affected are presented by A. F. Stuebing, assistant to manager of sales, Carnegie-Illinois Steel Corp.

Letters TO THE Editor

Claim Costs

Sir:

I noticed in your issue of May, page 76, an article entitled "Claim Costs Can Be Cut" by R. L. Baumgardner, claim agent. At the end of the fifth paragraph, is a suggestion for documents that should be attached when a claim is filed. The first of these is a copy of the bill of lading and the fourth is a copy of the freight bill.

In all our dealings with the various carriers, we find that they want the original documents, that is, the original bill of lading and the original freight bill also, otherwise, a bond of indemnity invariably has to be filed.

I am just directing this to your attention, as I feel that a number of people in reading this will get the wrong impression as to what the claim department really needs. Then, too, I imagine that you also have had some comments from claim agents of the various modes of transportation. — **L. W. Whitaker, chairman, Freight Claims & Claims Prevention Committee, National Industrial Traffic League.**

Growing Pains

Sir:

Robert F. Odell's article "Growing Pains of Air Cargo" in the May issue of *DISTRIBUTION AGE* contained some cogent thoughts that should prove of benefit and interest to air freight operators.

Of the problems outlined by Mr. Odell, a notable exception is the major one of traffic solicitation which, while it was touched upon in connection with his consideration of rate structure, perhaps was not given the importance it has in relation to the success of an air cargo operator.

Ex-servicemen have found that securing air crews, planes, and capital probably is easier than securing traffic and the handling of such traffic to the satisfaction of shippers and with profit to themselves.

It may be of interest that our company has been formed recently by a group of veterans both with prewar and during-the-war transportation experience to perform services for the air freight operator, whether contract or CAB certified, which we feel will aid materially in

solving the traffic problems confronting the carriers.

Designed exclusively to serve the air cargo field without alliance or pressure from any surface carrier organization, the company is now in the process of setting up air freight terminals at airports in New York, Chicago, San Francisco and Los Angeles.

At a fixed fee per hundred weight traffic will be loaded and unloaded for carriers, picked up or delivered between shippers and consignees and airports; loads checked, manifested and billed; collections made of carriers' charges; loss and damage reports rendered and, in general, all details of traffic handling taken care of between landing and take-off of the aircraft.

To provide a continuing source of traffic for air freight lines and make the services available to less-than-plane-load shippers, the company also has made application for an air freight forwarder's certificate from the CAB.

If carriers establish rates permitting profitable operation of an air forwarder service, they will encourage the development of a traffic solicitation organization which will remove many of the major traffic problems they now face.—**John S. Gorby, Eastern Traffic Manager, Emery Air Freight Corp., New York City.**

Editor's Note: Because of the interest and importance of the proposed air cargo terminal operations mentioned in Mr. Gorby's letter, we have asked him to amplify the information he has given here, and he has agreed to write a brief article on the subject for an early issue. Mr. Knight of Eastern Airlines touches on the same matter elsewhere in this issue.

Information

Sir:

Attached you will find our check for \$5.50, covering one year's subscription to *DISTRIBUTION AGE*.

We have found the articles and other material contained in issues we have seen already to be very interesting and informative. Therefore, we wish to receive your publication regularly.—**E. J. Metcalfe, Traffic Manager, Atlantic-Acadia Sugar Sales Co. Ltd., Montreal, Canada.**



People in Distribution

TRANSPORTATION

New officers, Traffic & Transportation Club of Philadelphia are: President, **E. Bruce Ritchey**, Lukens Steel Co.; vice president, **Edward J. Bolton**, Luria Bros. & Co., Inc.; secretary, **John E. Bellwoar**, Paper Mfgs. Co.; treasurer, **Theodore R. Glick**, John T. Lewis & Bros. Co. Directors include **Earl Grolock**, **W. E. MacGregor**, **Wm. H. Boggs**, **Warren A. Miller**, **Fred Oxman**, **Robert J. Stephens**.

John W. Thompson has been named vice president and director of information, Air Transport Assn.; **G. M. Springer, Jr.**, Braniff Airways, chairman, Traffic Committee-Air Express, succeeding **Harry E. Stringer**, retiring chairman; **R. E. Whitmer**, Transcontinental & Western Air, vice chairman. **Emery F. Johnson**, secretary, Cargo Traffic Section, was renamed executive secretary. **Morril B. Spaulding**, formerly with United States Navy Bureau of Aeronautics, has been named assistant to director **Allen W. Dallas**, engineering division. Advisory Committee to supervise activities, Shippers Research Div., are: **G. K. Brower**, American Airlines; **J. T. Hendren**, Pan American Airways; **F. B. Quackenbush**, United Air Lines; **J. J. Harrington**, Northwest Airlines; **W. A. Weeks**, Eastern Air Lines and **J. D. Lawson**, Chicago & Southern Air Lines.

Swedish Intercontinental Airlines, announced appointment of **W. J. Kane**, Santa Monica, Cal., as West Coast Representative for the airline which anticipates inaugurating regular service between the United States and Scandinavia soon.

William McTaggart, traffic manager, Trans Caribbean World Airways, has been promoted to general traffic manager of the airline.

Arthur C. Smith, Los Angeles, has been made cargo traffic manager, Western Air Lines, replacing **Ray Grant**, recently resigned.

Steve Canton, who formerly handled rail publicity, Railway Express Agency has been named air express publicity representative, succeeding **Ted Rosen**.

Frank J. Krantz succeeds **E. J. Forman**, retired, as traffic manager, Globe Division, Pillsbury Mills, headquarters, Los Angeles. (Kline)

The Industrial Traffic Assn., San Francisco elected the following officers: **Theodore J. Label**, president, **George S. Beach**, vice president, **Glenn T. Gleason**, secretary, and **James L. Roney**, treasurer.

James Finnin has returned to Railway Express Agency as assistant to air traffic executive **P. H. Cummings**, with offices in New York.

Election of **Paul H. Startzman** as a vice president and director has been announced by **Drake, Stevenson, Sheahan, Barclay, Inc.**, distribution and materials handling consultants, 50 Church St., New York. Mr. Startzman succeeds **Herbert A. Stevenson**, who on the advice of his physician has become inactive and is taking an extended vacation from active business.

MARKETING

Robert J. McGreevy, McDonald, Pa., former Navy lieutenant, materials handling section, Bureau of Supplies & Accounts, has been appointed assistant district manager, Industrial Truck Sales-Engineering, metropolitan New York area, for **Yale & Towne Mfg. Co.**; He will be associated with **Carl E. Lang**, recently appointed New York district manager, Industrial Truck Sales-Engineering, with offices, Chrysler Bldg., New York City. Advancement of **James S. McCullough** to manager of sales promotion and advertising, has been announced by the Philadelphia Division.

Fry-Lawson & Co. has been incorporated as **George Fry & Associates, Inc.**, consulting management engineers. Officers are: **George Fry**, chairman; **Thomas A. Harwood**, president; **William J. Biehl**, **Robert F. Dick**, **George N. Saum**, vice presidents; **A. Werner Lawson**, secretary-treasurer.

Marvin W. Thompson has been named promotion manager, rural and suburban market development, National Electrical Mfgs. Assn., New York City. (Kline)

Raymond Sheehan has resumed his duties, sales manager, Great Atlantic & Pacific Tea Co., Seattle, Wash.; will also handle advertising and sales promotion. (Kline)

Henry Olnhausen, formerly traffic manager, Commercial Metals Treating, Inc., Toledo, has been promoted to production manager. **L. J. McGrady**, formerly advertising manager, Swartzbaugh Mfg. Co., that city, was named sales manager. (Kline)

Frank Hopewell, sales manager, P. Lorillard Co., has been elected vice president in charge of sales. (Kline)

Chester Mfg. Co., Lisbon, Ohio, chain hoists, trolleys, etc. which has operated as a partnership, has incorporated as **Chester Hoist Co.** Officials are: President, **Hal F. Wright** (founder of the business); vice president, **Mary T. Wright**; secretary and treasurer, **Harry E. Hill**.

Towmotor Corp., Cleveland, industrial trucks and tractors, has appointed **Alfred H. Roth** advertising and sales promotion manager. He formerly was a captain in the AAF. Prior to war service he was associated with **Talon, Inc.**

R. E. McIntosh, sales promotion and advertising manager, has been elected a vice president, **General Foods Ltd.**, Toronto, Canadian unit of **General Foods Corp.**, and will continue his former duties. (Kline)

Herbert T. Florence has been elected president and general manager, **The Cleveland Crane & Engineering Co.**, Wickliffe, Ohio; **A. C. Garnett**, was named vice president and treasurer; **W. G. Wehr**, secretary, and **W. D. Vanderbilt** assistant secretary.

W. F. Hebard, president, **W. F. Hebard & Co.**, announces the removal of the sales and factory divisions of his organization to enlarged quarters at 336 W. 37 St., Chicago. The company produces **Shop Mule** industrial tractors.

WAREHOUSING

Ben J. Tappe, Seattle, was elected president, **Washington State Warehousemen's Assn.** and **W. J. Dickinson**, Seattle, was named secretary-treasurer. (Haskell)

Newly elected officers, **Minnesota-Northwestern Warehousemen's Assn.** are: **Stanley W. Brooks**, Minneapolis Terminal Warehouse Co., president; **L. L. Oldham**, Merchants Cold Storage Co., vice president; **George LaBelle**, LaBelle Safety Storage & Moving Co., treasurer; and **A. L. Carr**, Northwest Warehousing Co., secretary.

R. C. Greeley, The Greeley-General Warehouse Co. has been named president, Assn. of Cleveland Warehousemen, Inc., **C. N. Smith**, Sheriff Street Storage Co., vice president, and **F. L. Conaty**, Curtis Storage and Transfer, Inc., secretary and treasurer.

Upon resignation **Fred G. Kimman**, Flagg Storage Warehouse Co., Syracuse, N. Y., **Mrs. Alice C. Whiting** was elected president; **Miss Irene W. Smith**, Troy, vice president and **Miss Marion E. Smith**, Fort Plain, secretary.

Charles E. Nichols, secretary, merchandise division, **American Warehousemen's Assn.**, and **W. M. O'Keefe**, executive secretary, **National Assn. of Refrigerated Warehouses**, a division of the **American Warehousemen's Assn.**, have announced a change in the address of their Washington offices. The new address is 1005 E Street, Northwest, Washington 4, D. C.

Monorail Cargo Handling

(Continued from page 74)

perience has shown that this method, which is followed by many other suppliers of special marine equipment, results in minimum ultimate cost, trouble free performance, and ready acceptance of the equipment by the owner.

The barges have received very wide publicity, both in the technical and the popular press. Most of these articles described the unique concrete hulls or the ar-

rangements, equipment and machinery, brushing over or ignoring completely the electric cargo handling equipment.

A few particulars will be given to obviate the need for reference to other articles:

Length, overall, 265 ft. 0 in.; breadth, inside fenders, 48 ft. 0 in.; depth, main deck, 17 ft. 7 in.; for 3 reefers: deadweight capacity, over 1,000 tons; contents refrig-

erated spaces, 122,000 cu. ft.; 500 gals. ice cream/day; 5 tons ice/day; total refrigeration, 53 tons/day.

The vessel has no rudder, and two fixed skegs are fitted under the stern. From the vertical transom stern a flat bottom slopes to the base line. Amidships the sides are vertical, and the bottom rises only 1 in. to a 3 ft. 6 in. radius bilge. A raised forecastle deck 9 ft. above main deck extends 32 ft. from the stern, which is flat and vertical down to main deck, and sharp and raked below. All of the hull shape occurs 66 ft. forward and 68 ft. aft of the parallel middle body, which is 131 ft. long. A concrete ramp connects the main and fore-castle decks on each side outboard of the deck house, the slope being 9 ft. in 24 ft.

Six main transverse bulkheads of precast concrete construction divide the concrete hull into fore peak, forward void, four cargo holds each 48 ft. long, and after void space. Each cargo hold is served by two hatches, located abreast, as indicated in Fig. 1, and served by the Spencer & Morris Monorail trolley system. On the reefer hulls a centerline bulkhead is fitted in each cargo hold. The main deckhouse is of wood, 216 ft. x 40 ft. x 12 ft. overall (225 ft. long on reefers). Three double hinged cargo doors are provided in each side of the deckhouse, two for use of the cargo hoists and one for access while hoists are operating. On the three reefer barges this third door was omitted to simplify the installation.

On the three reefer barges, an insulated wood plug type hatch is provided in the top of the wood deckhouse over each main deck hatch. This permits rapid loading and discharge of frozen meat when overhead shore terminal gear is available. Otherwise, these plugs remain in place, and all cargo is loaded and discharged through the side doors using the ship's own electric equipment.

Wine Industry

(Continued from page 89)

ing out its own more or less home-made devices and this article will attempt to outline the main ones. Tentative as they are, they have already saved a good deal of time and trouble for vintners.

The technical advisory committee of the Wine Institute was formed in 1942, primarily for studies and exchange of information on wine-making techniques. It was composed of chemists and production men and a sprinkling of management representatives who met quarterly to talk over industry problems. By 1944, the most acute problem in the industry was the shortage of manpower and the loss of experienced workers.

The superintendent of production of the Petri Wine Co. is understood to have been the first to suggest to the industry that it was time to start solving the problem of moving grapes from the field to the crusher box by mechanical methods. Subsequently, Ze'ev Halperin, chief chemist with Petri, was appointed to head a sub-committee of the technical committee on the solution of the problem. In addition to Petri, Roma Wine Co. and Italian Vineyards (now owned by Garrett & Co.), were working on the same problem. Petri made small models of proposed equipment at the winery; Italian Vine-

yards' maintenance superintendent Victor Danzo and ranch superintendent Alfred Signorio experimented in their own shops and developed a mechanical grape loader. A vacuum system also was being studied.

Italian (I. V. C.), whose 5000-acre Guasti vineyards are considered to be about the largest in the world, had the incentive to develop its own handling system because, unlike many wineries, it grows and transports its own grapes. It produced two experimental loaders mounted on Caterpillar tractors. Each loader consisted of a double conveyor belt arranged so as to incline upward, leaving it 2 ft. off the ground at the loading end and about 9 ft. at the unloading end.

The system was, to have the mechanical loader drive up to a stack of filled field boxes, and a dump truck back up until the body was below the high end of the conveyor belt. The driver of the loader would then start the belts and the loading would begin. The loaders tossed the grapes into the hopper at the low end of the conveyor, the belt rapidly carried the grapes up the incline to be dropped into the truck. Each mechanical loader has two conveyor belts. Working both, I. V. C. found that a loader can elevate 3½ tons of grapes in 4½ minutes.



Getting Down to Cases In Distribution

FINANCE & INSURANCE • HANDLING & TRANSPORTATION
PACKING & PACKAGING • WAREHOUSING & MARKETING

By LEO T. PARKER
Legal Consultant

MARKETING



THE proper measure of damages allowable a seller of merchandise when a purchaser breaches an ordinary contract is the difference between the contract price and the market value of the merchandise at the time and the place of delivery specified in the contract.

If a purchaser intended to resell the merchandise he is entitled to recover as damages the profits he would have earned had the seller not breached the contract.

In *Franklin v. Pence*, 36 S. E. (2d) 505, W. Va., testimony showed that a purchaser entered into a contract to purchase a definite quantity of merchandise for resale. The seller failed to deliver the merchandise and the purchaser sued for damages.

The higher court held the seller liable to the purchaser for damages equal to the profits he would have earned by reselling the merchandise. The court said:

"The profits were not uncertain or speculative. Profits which can be ascertained with reasonable definiteness are not speculative, are proper elements of damages for breach of contract, and may be recovered."

Invalid Contract

A sale contract is invalid where either a buyer or seller submits an offer which the other cancels before the offer is unconditionally accepted.

In *Imported Liquors Co. v. Angeles Co., Inc.*, 152 Fed. (2d) 549, it was shown that a buyer signed an order to purchase a quantity of merchandise and gave his check for \$1,400 as a deposit. This order was signed by the purchaser, who then sent a telegram canceling the order. This telegram was delivered to the seller before he had notified the purchaser that the order was accepted.

The seller sued the purchaser for breach of contract. The higher court held the purchaser not liable, saying that the order for the merchandise was a mere offer to purchase, and since the order was canceled and revoked before it was accepted, no valid agreement to purchase resulted.

Arbitration

Contracts are valid which require contracting parties to arbitrate rather than to settle a legal controversy in

the courts, providing both parties comply in detail with the agreement to arbitrate.

In *Los Angeles Co. v. Friedman*, 165 Pac. (2d) 728, Cal., it was shown that a contract contained a clause providing that all controversies would be submitted to and settled by arbitration.

The higher court allowed a suit to proceed and said that where a contract provides that a demand for arbitration must be filed within a stated time, and the party desiring arbitration permits the agreed time to pass without making a demand, such party waives his right to arbitration.

TRANSPORTATION



CERTIFICATES obtained through fraud or misrepresentation are invalid.

In *Lattavo Bros., Inc. v. Public Utilities Commission*, 65 N. E. (2d) 653, Ohio, the Public Service Commission found that a transportation company operated motor vehicles under a certificate fraudulently obtained from the Commission without paying the required amount for the three tax receipt cards used.

The higher court promptly revoked the certificate of the company to transport property in intrastate commerce.

Contract Carrier

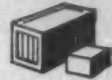
A corporation may operate motor trucks for its own convenience without a permit, but it cannot organize and operate another corporation to transport its merchandise unless the new corporation is issued a permit.

In *Schenley Distillers Corp. v. U. S.*, 66 S. Ct. 247, the Supreme Court of the United States held a new corporation to be a "contract" carrier and not a private carrier, where the corporation was organized to transport products for its parent corporation.

Grandfather Clause

Inability of a carrier to prove that its failure to operate over routes applied for was due to circumstances over which it had no control, will result in the forfeiture of its permit rights under the "grandfather" clause. See *McAllister Lighterage Line, Inc. v. U. S.* 66 S. Ct. 731.

PACKING and PACKAGING



A MANUFACTURER may be liable in damages if he bottles and sells a product that is injurious to certain persons, although other persons are not susceptible.

In *Carter v. Yard Co.*, 64 N. E. (2d) 693, Mass., the testimony showed that a woman bought a bottle of perfume. She suffered a second degree burn when she applied the perfume to her skin. She sued the manufacturer for damages.

The higher court held the woman entitled to recover from the manufacturer, saying:

"In this case the defendant (manufacturer) had full control of the manufacture of the perfume and the filling of the bottle . . .

The higher court explained that a manufacturer never is liable in damages for injuries to purchasers of its product, if the testimony shows:

1. That the injured person came into contact with the dangerous thing by a trespass.

2. That a manufacturer may be absolved from blame because of a justified reliance upon inspection by a middleman.

3. That the causal relation of a manufacturer's negligence to the injury may be broken by the intervention of a superseding cause such as some negligence or fault of another, whereby the manufacturer's negligence ceases to be the proximate cause of the injury.

Trade Mark Law

The primary purpose of laws which prohibit use of similar trade marks on merchandise in the same general classification is to prevent confusion or mistake in the mind of the public.

In *Skol, Inc. v. Olson*, 151 Fed. (2d) 200, it was shown that two manufacturers used the trade mark "Skol" and "Skool," which are identical in sound. The Skol Co. uses its mark "Skol" on a sun-tan lotion. The other manufacturer is engaged in bottling mineral water and uses the trade mark "Skool" on its beverage.

The higher court held that it is illegal for both manufacturers to use these trade marks, although the bottler argued that mineral water is not in the same classification as sun-tan lotion. The court said:

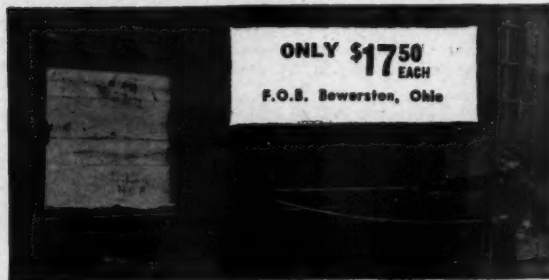


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Competition

Unfair competition is deceit, whereby a seller's patronage is diverted from him to the wrongdoer. Unless deceit is present, there is no unfair competition.

WAREHOUSING



TRANSPORTATION of merchandise from within a state to a warehouse for storage is not within jurisdiction of the Interstate Commerce Commission.

In *ICC v. Columbus & G. Ry. Co.*, 153 Fed. Rep. (2d) 194, it was shown that a railroad company engaged a motor truck owner to transport merchandise to a warehouse from farms of growers. On delivery of the merchandise to the warehouse, negotiable receipts were issued to the growers and the merchandise remained in the warehouse for period of from six to eight months before it moved over the railroad in interstate commerce. The court held that transportation of the merchandise to the warehouse was not in "interstate commerce" and compliance with federal laws was not necessary.

Vibration

According to a late higher court decision, if stocked merchandise falls on a warehouse customer and causes an injury, the customer may recover damages.

In *Leone v. Safeway*, 44 Atl. (2d) 913, N. J., the testimony showed that a customer was severely injured when, as she was passing through a narrow space, several cans fell on her foot. She claimed that the fall of the cans was caused by vibration of a heavy truck passing through the street. The jury held the customer entitled to recover \$1,500 damages. The higher court approved the verdict, saying:

"The question whether or not the fall was due to vibration caused by a truck, or mere faulty stacking of the goods, seems to us quite immaterial."

Not Nuisance

A late higher court refused to issue an injunction preventing erection and operation of a warehouse in a residential section of a city.

In *Roberts v. Rich*, 37 S. E. (2d) 401, Ga., certain property owners filed suit for an injunction to prevent the erection of a warehouse in a residential district. The higher court refused to issue the injunction saying that a warehouse in a residential section of a city is not necessarily a nuisance. However, this court said that if, after the building is completed, the business is operated in such a manner as to cause a nuisance, the parties aggrieved may then apply to a court and enjoin its operation.

Mechanical Handling Costs

(Continued from page 35)

made on the solution of this complex problem. Expendable pallets are being developed and considerable thought is being given to the possibilities of a pallet pool, which was recommended in the pages of this magazine by Matthew W. Potts a couple of years ago.

The most outstanding factor in the entire present materials handling picture is the increasing number of plant operators who are creating materials handling divisions, or who are seeking help in establishing a committee or department with the specific responsibility of studying the flow of materials. A great number of these materials handling engineers are from the armed forces.

It has already been found that where top management gives its materials handling engineers a free hand, the result is a materials

handling system that saves tremendously in time, effort, and money, not only in moving and storing goods but also in production costs.

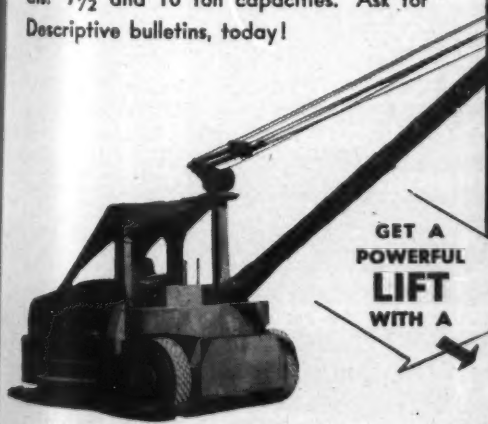
Management often is reluctant to release information or to voice opinions regarding the advantages of materials handling machinery because of policy reasons. However, here is the experience record of one company in handling shipments for the armed forces: 225,609 tons were shipped by truck in unit loads on pallets. Using fork trucks, it took 3,223 man-hours to unload the goods. Had each case been handled individually by manpower alone, approximately 90,243 man-hours would have been required. In other words, the fork truck and pallet system saved 87,020 man-hours, or 97.54 percent over manual handling.

You can readily appreciate what such a saving in manpower means in reduced payroll expense. But that is a part only of the total economy. Because the fork truck and pallet system speeds handling, trucks can make more trips and are not tied up awaiting loading and unloading. Quantity handling in unit loads on pallets eliminates costly piece-by-piece rehandling. In addition, by avoiding needless rehandling, the safety factor both for the load and the worker is increased. Damage claims and employee accident insurance rates are reduced.

Even though our postwar economy is still in a state of flux, the experience gained in moving materials during the war unquestionably will lead industry in new production heights and bring about lower distribution costs.

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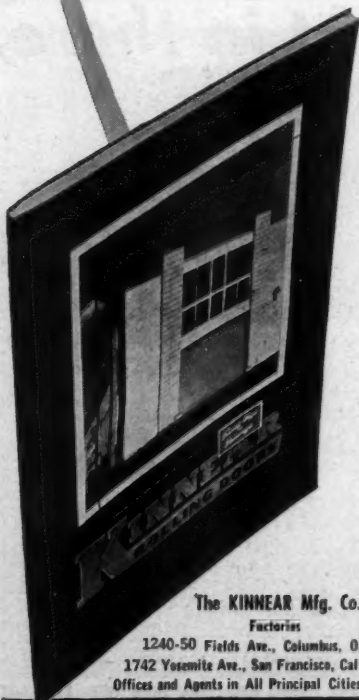
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Packing and Handling

(Continued from page 80)

place of use. The result was the design of a new individual package and the development of a unit pallet load steel strapped for shipment. For convenience of handling and to come within certain limiting factors of the problems, loads were restricted to 3500 lb. and to a pallet 36 in. x 42 in.

Pallet loads assembled at the manufacturing plant in the east were handled by a carloader from the shipping platform into a box car and tiered to ceiling height. The car moved by rail to the automotive plant at Flint where a similar fork truck removed the unit palletized load out of the car across the dock, whisked it away to the warehouse and tiered the unbroken unit pallet load ceiling high, to await the time when the product should be needed on the assembly line.

When production started, a fork truck removed the top unit of the palletized load and carried it to the assembly line where the package was broken and the product made available for use.

"Inertia is the property of matter by which it will remain at rest or in uniform motion in the same straight line or direction unless acted upon by some external force." Webster's definition of inertia is also applicable to the habits of men. Routine or traditional practice is human inertia, the greatest enemy of progress.

We encountered in warehouse tradition the greatest obstacle to "the carloader method." From time immemorial the warehouseman considered it his duty to open, check and count the contents of packages and shipments as received. It took an order from a brass hat to overturn this warehouse tradition and practice as related to the unit pallet load. This must remain a unit until broken at the time and place of use. The errors finally discovered in those latter months were very minor, largely errors of count. The sum of adjustable shortages was only a fraction of the savings effected in handling costs.

Having worked out the theoretical movement of the commodity from place of origin to place of use and having evaluated the savings made possible by the new method, we then had to design a vehicle to move under power the unit palletized load at each point of transfer.

Here are some of the factors that had to be designed into the vehicles: lift and carry a 3500 lb. unit pallet load from shipping platform through a box car door and tier this load to ceiling height, thus utilizing the one-third of cubic car space at the top which normally could not be filled by shipper, to the detriment of the carrier.

A similar power truck had to remove the unit palletized load at point of delivery, take it out of the car across the receiving platform into the warehouse and tier to ceiling height; but the car ceiling was at the most 8 ft., the warehouse ceiling was 12 or 16 ft.

There was no fork truck built by our competitors or by Clark that would meet all of these requirements for the motivating vehicle so our engineers had a problem laid in their laps.

Through the courtesy of railroad men and those familiar with railroad problems, we conducted a survey of the equipment designed for carloading. We were astounded to discover that for 80 years there had been no new pieces of equipment designed for the loading of packaged material into box cars. The 2-wheel hand truck still held sway, with such aid as the platform truck with skid loads could give.

These trucks, good as they were, could lift and carry but were not suitable for tiering. Out of the crystallized facts developed by analysis of the shipping problem and railroad conditions came "the carloader method" and the Clark carloader to implement the method.

The industrial tempo quickened. Things began to happen rapidly. The method was conceived in 1937

and born in 1938. It grew up during the war years when the armed forces were required to move hundreds of thousands of tons of packaged commodities in support of the war effort.

Let us now study for a moment some of the factors that must be considered in the proper solution of our problem. Packages, as engineers know, are designed to meet the exact needs of a product requiring dimensional limitations as to size. We must study the density of the product, which is the relation of the weight of the product to its mass.

The packaging engineer's responsibility does not end with packaging. He must envision the life history of the product as it moves from inspection through the packaging process and the successive steps in its movement to the point of use in the customer's plant or the consumer's hands.

At this point the materials handling engineer steps to the side of the packaging engineer, giving him the benefit of his experience. A

vital factor in the successful solution of the problem is the elimination of unnecessary and avoidable individual handling of the packaged product; i.e., multiple handling.

The greater the density, the greater the weight—the smaller the pallet, the lighter the density, the greater the carton dimension—the larger the pallet. Thus the packaging engineer, consulting with the materials handling engineer, has the choice of the following standard pallet sizes: 30 x 40 or 42; 36 x 42; 42 x 42; 48 x 48.

The pallet size is not all of the problem of pallet selection. For the purpose of our present consideration, pallets are to be classified under three headings: expendable; durable; permanent. These I will briefly describe as follows:

The *expendable pallet* is of a type, size and specification so that it may be used to make one or probably more trips. It must be low in cost, simple in design, light in weight and of such a nature as to have only scrap value. The cost

must be less than the savings effected on the first movement in which the pallet is used. This pallet probably will be made of paper or some other cheap material.

The *durable pallet* is of such size, design and specification as to permit repeated use to a maximum of eight to 10 trips. It will have a much longer life if it is used to any great extent for warehouse or simple storage purposes. The durable pallet will be found to be made of wood or possibly paper, plastic or a combination of the same. Care must be used in the selection of the durable pallet or maintenance costs will be high, depending upon the character of the commodity with which it is to be used, the packaging of it, loading, etc.

The *permanent pallet* should be of such size, and design as to be capable of continuous reuse with low maintenance cost, means of identification and protection of ownership.

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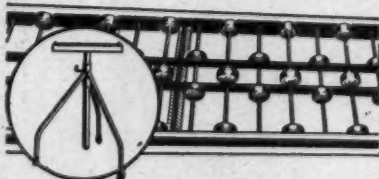
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proper size pallets under the three classifications as follows:

Expendable	Durable	Permanent
30 x 40 or 42	30 x 40 or 42	36 x 42
36 x 48	36 x 48	40 x 48
40 x 48	40 x 48	42 x 42
42 x 42	42 x 42	48 x 48
	48 x 48	48 x 60
	48 x 60	48 x 72

The recurrence of 40 x 48 in. dimensions in pallet sizes is caused by the size of motor trailers and railroad box cars. The motor trailer width will accommodate two 40 in. wide pallets; the box car width will accommodate two 48 in. wide pallets. Preliminary investigation on pallet sizes seems to indicate that the four-way 40 x 48 in. pallet will be most useful for combination motor truck and rail shipments.

There are a number of products which because of their size, weight and shape cannot be combined with others to form a unit. Properly crated, each can be handled as a unit load by powered material handling vehicles. Such items are: radios, stoves, refrigerators, washing machines, etc. It is the packaging engineers' responsibility to include in the crate design the necessary 3 in. under-clearance to permit the insertion of the forks.

The competent specialist, be he a packaging engineer or a material handling engineer, or the two working hand in hand must be able to segregate and define the ascertainable facts as to the birth of the product, its clothing in proper shipping garments, the cartoning into a suitable overcoat and the grouping of cartons on to a correct pallet of appropriate design and construction to meet the requirements of the problem.

Handling Problems

(Continued from page 46)

trouble whatever with this depression collecting water. You will see from the above that the pitch was only a little more than one-half inch to the foot, so that the truck body does not stand on an incline or present any other handicaps to loading.

None of the equipment that we have installed is at all revolutionary or new. It is something that almost any warehouseman can use to good advantage.

Planning Materials Flow

(Continued from page 34)

Just what do we mean by the unit-load method?

Before World War I, the efficiency of four-wheel push trucks was improved by coupling them together train-wise and pulling multiple loads with a tractor. The push truck also was equipped with electric drive and controls and was known as a load-carrying truck. Examples of both systems are still generally used, especially by railroads, and may be seen at any metropolitan depot. True multiple loads may be handled effortlessly but we still have piece by piece loading and unloading.

With this improved efficiency of speed and cost reduction came the problem as to what could be developed so that loads might be prepared, stored and kept mobile without tying up expensive wheeled push trucks.

From this line of thinking the skid platform and hand or electric propelled jack or lift truck for its movement was developed. Here we have the birth of the unit-load system. The materials may be placed upon the proper size skid to a convenient height, moved to storage by a mobile lift truck, towed to point of storage or process, making as many moves as is required but always as a unit load representing many pieces of material.

Next, the electric or gas propelled high lift platform truck was developed, permitting the transportation of skid loads and allowing for use of the tractor train system. For example, the paper industry went all out for the adoption of the skid method of materials handling saving millions of dollars. Today, nearly every

printer has equipment to handle skid loads of paper.

The skid method is a unit-load system. It is a mechanical system of materials handling. It permits limited tiering operations, tiering operations limited to the crushing resistance of the material to be stored because the legs of the skid concentrate the load forces and may damage the materials even if the planking dunnage method is used. Skid loads tiered generally are not stable. The loads may float causing tier crumbling. You cannot safely fill the storage cube of the building by storing to girder height.

All of these deficiencies of a good system were studied, and about 1923 the first single faced pallet made its appearance. Like the skid, it had a deck of wood, but instead of legs like the skid,



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2 in. by 4 in. stringers served as legs. Obviously this reduced the vertical height of the platform from a minimum of 6 in. and a maximum of 11 in. to 4½ in., a saving in vertical space.

The conventional platform electric truck was redesigned to a tilting elevating suspended load pallet fork truck. Built upon the cantilever and counterweight principle this equipment permitted the handling of loads up to 4,000 lb. and for higher tiering in narrower aisles. But the single faced pallet still had the limitations common to skid operation.

About 1930 the double faced pallet was developed. Here we have the 2 in. x 4 in. stringers with deck boards fastened to each side. Tiering difficulties encountered

with the skid have been overcome. The crushing forces are now distributed over the square foot area of the pallet. Even if the lower load surfaces are uneven, stable tiering results because sufficient contact will be made with the material to keep the load keel level.

We have arrived at the average modern system of materials handling for general business operations. Your government during World War II went all out for the pallet unit-load system of materials handling, and many of you who were in the service operated or observed this system in action. The immensity of the task of moving billions of tons of materials during this war, quickly, efficiently and at low man hour consumption, was staggering.

Air Cargo Techniques

(Continued from page 76)

and in the writer's opinion, the easiest of all. However, equipment used for this method weighed 600 to 800 lb., and was considered too heavy for standardization.

The Evans system, which finally was adopted as standard tie-down equipment by ATC, was simple enough, and probably is the best available at present. The standard kit weighed only 250 lb., and consisted of quantities of ⅝ in. rope in 15 ft. lengths; metal eye hooks; metal rope tighteners, which, when applied to rope and twisted, would take up slack; metal bars with hooks on the end; slotted wooden bars to be used on heavy flat freight; metal clamps, which fitted on the metal bars and were jacked down either on the wooden bars or on a twist of rope after the metal hook bar was inserted; and a metal jack. This may seem complicated, and it was at first. It took quite a while for loaders to change their knot tying habits and try a new trick, but eventually, they came to prefer it in almost all circumstances. There is perhaps only one disadvantage to this system, and that is that loaders frequently will become over-zealous in the use of the jack tightener with the result that cartons and

other soft freight may be crushed or cut by the rope.

The planes used regularly by the armed services to fly freight were not built as cargo planes, but were modifications of standard passenger airplanes, with reinforced flooring and wider cargo doors. Attempts were made to manufacture cargo planes, but very few were put into service before the end of the war. Of the converted planes, the C-46 (Curtis Commando), C-47 (Douglas DC-3), and C-54 (Douglas DC-4) were used with most success.

The plane built to carry the air cargo commerce of the future will eliminate the disadvantages in cargo stowage present in planes of today. Some of these disadvantages are the rounded cabin, producing insufficient bulk capacity; the slanting cabin, making for difficult and unsafe loading of heavy pieces; high level loading doors; inadequate flooring and tie-down facilities; low payloads; and high operating costs. The Fairchild Packet solves many of these problems with its large door, truck level loading, high payload, and boxcar fuselage. It will be interesting to see how this model performs in commercial operation.

Package Car System

(Continued from page 65)

car loading and, second, reduction in handling. Car efficiency was of primary importance. These changes have been reflected in each new "Way to Ship" bulletin, in the space regularly devoted to "Changes in Service". During the early war period, as the railroads became more and more crowded with traffic loads, and as the problem of competent rail personnel became more acute, there were many changes in the total number of terminal points or break-bulk shipping points to which package cars were operated. Also, there were marked changes in the total number of package cars operated.

This point is well indicated by comparative statistics for the years 1931 and 1941, as contrasted with 1942 and 1945. In 1931, a total of 600,998 package cars were reported outbound from Chicago.

The total for 1941 was 491,892; as contrasted with a drop of 349,038 cars for 1942, and a further drop to 254,515, cars for 1945.

It should be explained, however, that a considerable part of the sudden drop in totals of package cars was due to need for heavier loading and to Office of Defense Transportation Order No. 1, effective May 1, 1942, which restricted the operation of rail merchandise cars containing less than 10 tons of freight. Previous average weight loadings of the package cars are not available; but during depression years it is certain that a considerable percentage of them carried less than the minimum of 20,000 lb. required during the War period by ODT.

Another noticeable war-time effect on the Chicago package-car system has been increases in the "time schedule in days" for pack-

age cars. For example, an increase in most Chicago-Pacific Coast delivery schedules from "6th morning" to "8th morning"; and also the addition of one day to the delivery periods for many destinations at lesser distances.

However, there have already been a number of recent postwar service improvements. One such change became effective March 21, when package-car schedules were reduced back from "8th morning" to "7th morning" for Fresno, Los Angeles, Oakland, San Diego, Sacramento, San Francisco, Portland, Seattle and Tacoma. It is expected that "6th morning" delivery to the Pacific Coast will soon be restored.

Undoubtedly one of the most effective procedures in the promotion of our package-car system has been the recent issuance of a monthly "Summary of Package



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Longer truck life means less repair and less replacement—results in lower hand truck operating costs. Every one of the 39 types and 60 sizes of American Hand Trucks is made of pressed steel. American Hand Trucks last longer—cost less to operate. Write today for a copy of the American Hand Truck Catalog.

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The American Pulley Company

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Car Performance by Roads." These carrier performance summaries have been furnished to the carriers, not with the intention of putting each individual road "on the spot" as to its comparative operating achievements, but because it has been the opinion of our transportation committee that this was information which the carriers desired in order to work out methods of improving the service at points where delays were occurring. It should be stated also that all carriers have been completely cooperative with the Association in furnishing the information necessary to publish the Package Car Bulletins.

In evaluating and compiling these data for our reports, some rather strict rules are observed. When a car is "placed" for unloading at a package-car terminal freight station, it must be so placed before 12 o'clock noon; otherwise it is counted "one day late" in arrival. Likewise, all cars that are scheduled to be placed for unloading in the afternoon, and are not so placed before 4 p. m. also are considered as being "one day late."

Our summary of package car performance by roads for one of our latest reported periods (March, 1946) shows the following interesting records: During that month 25,110 package cars were reported out from Chicago; and 15,819 of these cars (63 percent) arrived on time; but only 13,702 of these cars (54.6 percent) were placed on time. Of the remainder, 7,315 were placed one day late; and 4,093 were placed two or more days late.

In summarizing the previous record for the entire year of 1945, we find that of the total of 254,515 package cars reported out from Chicago, only 55.49 percent arrived on time; 25.24 percent were one day late, and 19.27 percent were more than one day late.

It must be pointed out that this is the poorest record ever made by the carriers, but it was caused by war-time conditions. Heavy troop and war freight movements were given preference. Furthermore, except for the few instances previously referred to, the schedules are pre-war schedules.

Palletizing Hardware

(Continued from page 44)

mit us to relax our sales efforts or to stint in our purchasing methods. If we are to maintain and increase our markets, the opposite effect will prevail, forcing up the costs of these operations. In most instances sales and purchasing personnel represent the highest calibre individuals employed by the trade. They, together with personnel in related jobs, constitute a minority of employees. They are generally compensated through the use of some type of incentive system so that any increased effort to improve sales and profits is to the advantage of the company and themselves.

On the other hand, the materials handling personnel constitutes the majority of employees in point of number. Excepting truck drivers, they are paid a fairly low basic wage with the result that the trade has not been able to attract many competent people into this important operation. Consequently there is considerable lost time due to the lack of incentive. The adoption of a fork truck system will enable management to hire one capable employe to replace three or four no longer required, and to pay him a basic wage comparable to road truck operators. The job itself will be more attractive in the sense that a man takes considerable pride in the care of his equipment and his ability to operate it efficiently. The way is opened for possible incentive compensation in the handling operation. It is much more reasonable to expect a man to increase his efforts where physical fatigue is small and pride in the job is high.

ESTIMATED SAVINGS. In considering the volume of business of the average wholesale hardware establishment it is evident that a single fork truck would be adequate equipment to operate the pallet system in most instances. Fifty to 80 car load shipments annually represent a conservatively estimated saving of 600 to 960 man-hours. That in itself is not sufficient to warrant the investment re-



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Made with the famous, protective
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Heavy duty, anti-friction bearing equipped machines
with 30" width belts—in 20, 25, 30, or 35 ft. lengths.
Ample head and side clearance for large packages.
Gasoline or electric motor drive.

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Weighs less than 500 lbs.—easily wheeled about by one person. Equipped with 1/3 hp. motor—plug it into any ordinary lighting circuit.

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quired to install the method. However, the extreme flexibility of the fork truck opens the opportunity for many new methods other than pure unit load operations.

For example, it is possible to replace the fork in a few moments with a goose neck crane attachment which can be used to handle bar steel, pipe and the larger sizes of fence and glass. The forks can be used for handling crated stoves, refrigerators, other home appliances and reels of wire rope. A single fork used as a ram is a practical method for handling heavy coils of wire and rope as well as large sizes of terra cotta pipe. The truck itself is actually a movable elevator and offers opportunities for the improved stacking of nested galvanized ware and many similar items. In conjunction with live skids and pallets it can be used to expedite making up loads for delivery to retailers. Inexpensive snow plow attachments are available for those firms with open docks and drives.

OBSOLETE WAREHOUSES. A recent survey by the National Wholesale Hardware Assn. reveals that there are relatively few modern warehouses in the trade. Most existing structures today vary in age from 25 to 50 years and more. The survey was conducted because of the extensive plans of a great many firms to build new warehouse facilities. The fact that few modern warehouses are in use is significant in that we are handicapped in planning new facilities by lack of any volume of experience to indicate the most practical and economical type of layout and construction.

It is therefore necessary to take advantage of the experience gained by some business with similar handling and storing problems. In the largest and most varied materials handling operation ever conducted, the army and navy have experimented with and perfected the use of the fork truck pallet method in the handling of all kinds of materials. They have also demonstrated the efficiency and economy of single story warehouse construction. These two ideas are very definitely related.

Multi-story construction, generally preferred in older handling systems, was required to obtain

large floor areas necessary to handle the variable types of goods in hand truck lots. However, multi-story construction is expensive and could not economically provide floors of very high ratings. With the advent of mechanical equipment, it became more desirable to take advantage of cheaper construction and high capacity floors, thus gaining the required space to store the merchandise by high stacking. Even in cases where a great diversity of items requires large areas in order to maintain segregation, it is more economical to use single story construction combined with balconies or racks designed to accommodate fork truck operations.

We cannot deny that there are some instances in the larger cities, where the expenditures required for multi-story buildings are justified by the relationship of distance to economical land districts. In the case of this group, however, it does not appear that the difference in distance between low cost land and low tax districts and our present locations is great enough to warrant the extra expenditure required to build a warehouse with floors and elevators of sufficient capacity to accommodate existing mechanical materials handling equipment. While we may now be denied the full use of the fork truck system by existing floor and elevator capacities, it is essential that management should be ever cognizant of the improving methods of materials handling in order that the essential requirements in building construction will not be overlooked when new facilities are planned.

TRUCKS AND PALLETS. An analysis of our present warehouse structures and capacities demonstrates that an 800 to 1000 lb. capacity electric fork truck, preferably with pneumatic tires, would constitute an ideal truck for wholesale hardware use. It would be of such weight and dimensions, with forks removed, that it could be accommodated in a 6-ft. 3000-lb. capacity elevator, could enter a standard 6 ft. high road trailer body, and would be able to lift about 8 ft.

A final consideration must be given to the problem of the manufacturer and distributor coordinating and standardizing pallet

sizes and loads. I have discussed this requirement with several manufacturers who now use the unit load system wherever feasible. They recognize that their present load units are too heavy in most instances to be handled by the average wholesale hardware firm. It is a fair estimate that these loads would have to be halved to overcome this obstacle. However, in every instance they have expressed willingness to make this change which only involves a change in pallet sizes as their equipment could still handle the lighter loads.

Wooden pallets 24 in. sq. costing less than \$2 would provide a universally adaptable size when railroad car, truck, fork truck and material sizes are analyzed. Pallet unit loads would directly effect efficient purchasing so that mixed loads of the various types and sizes involved in many carload shipments would not occur.

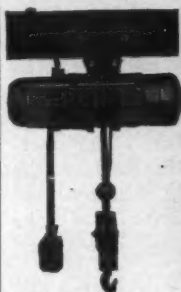
Since the hardware wholesaler is the final user of the pallet, it is essential that some method of pallet return or exchange be formed to relieve him of the burden of the pallet costs. There are two methods now in use. In many instances the manufacturer retains title to the pallets and returns them for re-use either at his own or the customer's expense. The other method is to invoice the pallets with the merchandise and issue a percentage credit when they are returned, this in the same manner as metal drums are now handled. In either event, the pallet use cost to the wholesaler will be extremely small, generally limited to the shipping cost.

VALUE DEMONSTRATED. During the war, a great many manufacturers who had previously had no experience with unit loads, were required to adopt the system by the procurement branches of the army and navy. Their experience has shown them the advantages and economy of the system to the extent that they are willing and anxious to assist in its adoption by their customers in order that they can continue to employ its advantages to the fullest possible extent.



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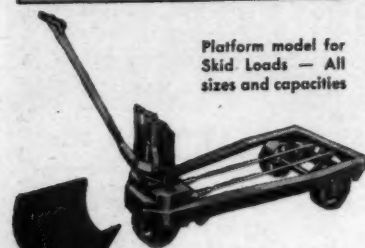


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Greene, N. Y.

- Send me your bulletin No. 140 on the Platform Model Truck
- Send me your bulletin No. 132 on the Pallet Model Truck

Company
Individual Title
Street City State

Steering . . .

(Continued from page 62)

employed in the regular seat model truck. The basic difference can be illustrated by those small trucks which, because the steering effort required is not great, utilize a horizontal bar as the most simple and natural steering arrangement. The operator steers the truck to the right or to the left by pulling the bar toward him or by pushing it away from him. Now, supposing that a vertical hand grip were installed on the bar. The operator's sense of feeling remains the same and he would still pull the handle or grip toward him to make a right turn, or push it outward to make a left turn.

That sense of feeling remains unchanged on modern fork trucks, where the steering bar has been replaced by a wheel with a vertical grip. The grip position, therefore, is important. It should be toward the rear of the truck. Since the operator normally does not

look at the steering wheel and since most operators will start pulling the grip toward them to make a right turn and pushing it away to make a left turn, the steering shaft moves in a direction opposite to that of the regular front-positioned steering wheel.

This type of steering is known as "reverse automotive" and is accepted by the industry as standard for trucks where operators stand while at work.

Users who want safe and easy steering on popular capacity fork trucks should insist upon five vital steering mechanism features:

1. Guide wheels having centered pivots.
2. Wheel forks mounted on anti-friction bearings.
3. Anti-friction bearings throughout all linkage, including steering reduction unit.
4. Center pivoted axle for load equalization on both guide wheels.
5. Correct placing of grip on the steering wheel of trucks designed for operators to stand while truck is working.



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TO MEET EXACT TRUCK NEEDS



Q5 Trucks with round corners, no projecting parts.

PLATFORM and HAND NOSE TRUCKS for various Warehouse and Cargo use.

Write for details and prices.



ORANGEVILLE MFG. CO.
Orangeville (Col. Co.), Pa.



Fig. 200-4
A popular Warehouse Truck

Handling Abroad

(Continued from page 60)

guay have been purchasers of conveying equipment, even though the transactions by their very nature had to involve small amounts of a few hundreds or thousands of dollars.

Canada and the U. S. S. R., were among the larger purchasers of conveying equipment taking as much as \$1,573,290 and \$1,769,472 worth respectively.

Among the better buyers on our hemisphere are Mexico with \$367,412, Cuba \$102,774, Venezuela \$271,825, Chile \$142,896, Brazil over a half a million dollars.

The United Kingdom bought to the value of \$690,195 and France \$152,876 worth of mechanical handling equipment.

Considerable analysis has been made of the industrial developments in South American countries. Indirect encouragement also has been given by our Government.

Traffic Factors

(Continued from page 91)

"merchantable" ore (which can be dumped in a blast furnace just as it comes from the earth) would be gone in 20 years, according to a report by Edwin A. Lahey, of the *Chicago Daily News*.

E. W. Davis, director of the Mines Experiment Station at the University of Minnesota, sometimes regarded as a pessimist, sees no danger of the range country folding up, but envisages an increasing efficiency in the concentration of low-grade ores as the "merchantable" ores in the Mesabi and the other ranges are depleted.

Besides the high-grade ore, with an iron content of 51.5 percent or more, there is a vast supply of marginal ore, iron content of which ranges from 35 to 51.5 percent. It can be concentrated by simple methods, involving only crushing, screening, washing or drying.

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IN the average fork-truck pallet installation the capital investment in pallets is greater than in the mechanical equipment. You demand **ENGINEERED DESIGN** in your industrial trucks to guarantee that you are receiving the most modern equipment adapted to your particular requirements and which will result not only in a reasonable first-cost but a low maintenance charge. It is only practical to demand as much from your pallet equipment.

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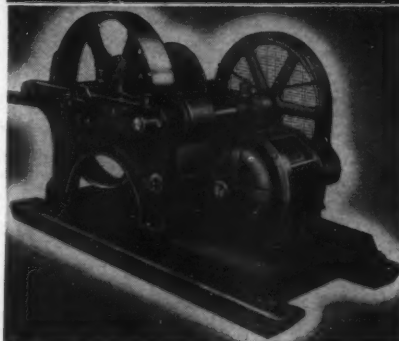
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Write for details and prices - see how easily installed Mason Whip Hoists can help solve your hoisting problems.

REPAIR PARTS
FOR MASON WHIP
HOISTS AVAILABLE

Here is a hoist that lifts baled, bagged, boxed or tied merchandise - as much as 1500 pounds as high as 50 feet in as little as 10 seconds . . . higher lifts proportionately.

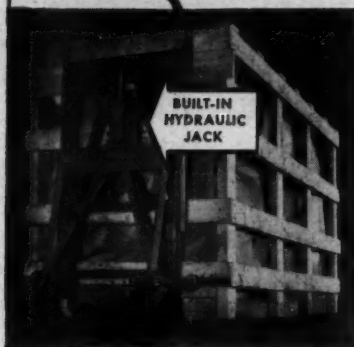
At only a fraction of the installation and operating costs of other types of equipment, Mason Whip Hoists use outside space or small hatchways, lift loads quickly and safely, and can be operated by any workman. Two men can shift loads directly from truck or car to storage floors, handling as much as 90 units per hour. Mounted in a penthouse, on a storage floor or suspended from the ceiling, Mason Whip Hoists save space, time and labor - handle bulky loads easier and faster.

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MOVES CRATES TOO BULKY FOR FORK TRUCKS, INTO PLACES CRANES CAN'T GO

Puts any crate, box or awkward manufactured unit on wheels—quickly! Does the work of four men. Available in two sizes . . . 4000 and 6000 pound. Each Rol-A-Lift is a set of two units, one for each end of crate. To use, insert stub forks and lift with built-in hydraulic jack. Full swiveling casters for work in close quarters. Lowers load at controlled speed. Hundreds in use by railroads, factories, warehouses.

write
for
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SKARNES
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Size Selection

(Continued from page 53)

is in binary fractions. In the decimal system, the range from 1 to 10, or its multiples (10 to 100, 100 to 1000, etc.), or its sub-multiples (0.1 to 1.0, 0.01 to 0.10, etc.) are divided into 5, 10, 20, 40 and 80 steps. The resulting series are called, accordingly, the

5-series, the 10-series, etc. The numbers of each series increase in a constant ratio. Hence in the 5-series, each number is about 60 percent larger than the previous one. In the 10-series, the increase is about 25 percent; in the 20-series, about 12 percent; in the 40-series, about 6 percent; and in the 80-series, about 3 percent."

Where the preferred numbers system is used, problems of standardization and simplification are greatly simplified since the use of this method tends to unify the choice of sizes constituting a range when these values are set up by different groups. The ASA gives an example: If one group of users of electric motors decides that it needs five step-ups between a 10 and a 100 kw motor and another group comes to the same conclusion independently, the two groups are likely to adopt different ratings for the motors in question. However, if both groups adhere to preferred numbers, they automatically will get the same set of ratings, namely 10, 16, 25, 40, 63 and 100 kw.

Also, if a line of electric motors has diameters and lengths of armatures expressed in preferred numbers, it may be assumed that any work connected with the surfaces of these armatures will progress by preferred numbers, as for example, time consumed for boring, turning, planing or painting such surfaces, compared with the time needed for the same operation performed on an armature where the diameter and length are based on another of the preferred numbers in the same geometrical series. This process will apply also to the weight and the kilowatt output of these armatures.

If individuals and smaller industrial units were to use the preferred numbers system as a basis for the planning of new designs prior to standardization by larger bodies, or before the national standardization agencies could function, it would facilitate greatly any program for subsequent standardization and simplification by larger groups. It often happens, however, that where well established and satisfactory standards already exist, it is found to be uneconomical to make changes merely for the purpose of standardization.

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ing, offices and showrooms, rigging, sales representation, sample distribution, sorting, stevedoring and various other functions for efficient and economical distribution.

This special advertising section of public warehousing has been consolidated for ready reference and maximum utility. It includes merchandise, refrigerated, household goods and field warehouses. For shippers' convenience, states, cities and firms have been arranged alphabetically.

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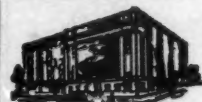
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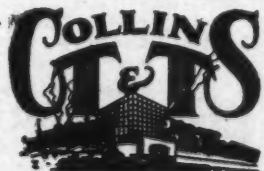
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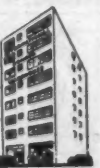
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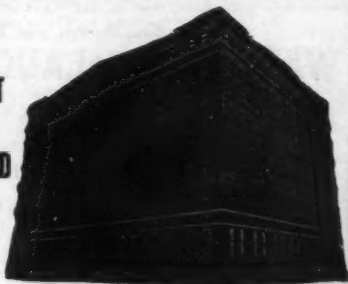




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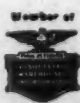
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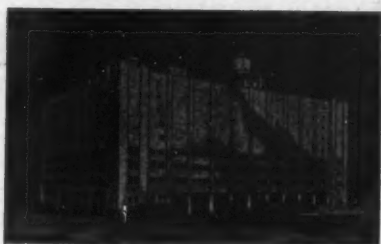
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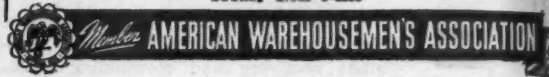
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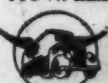
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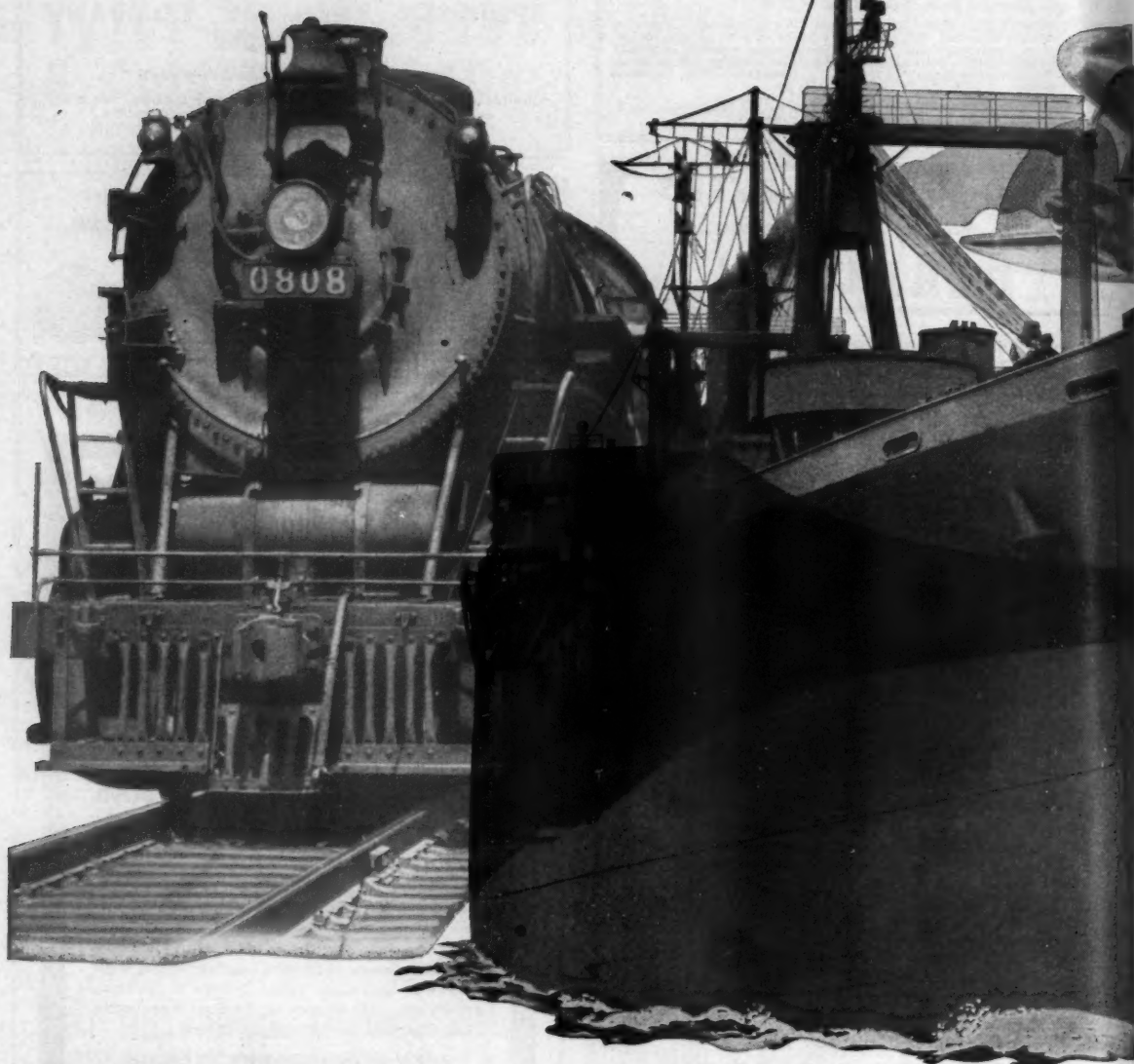
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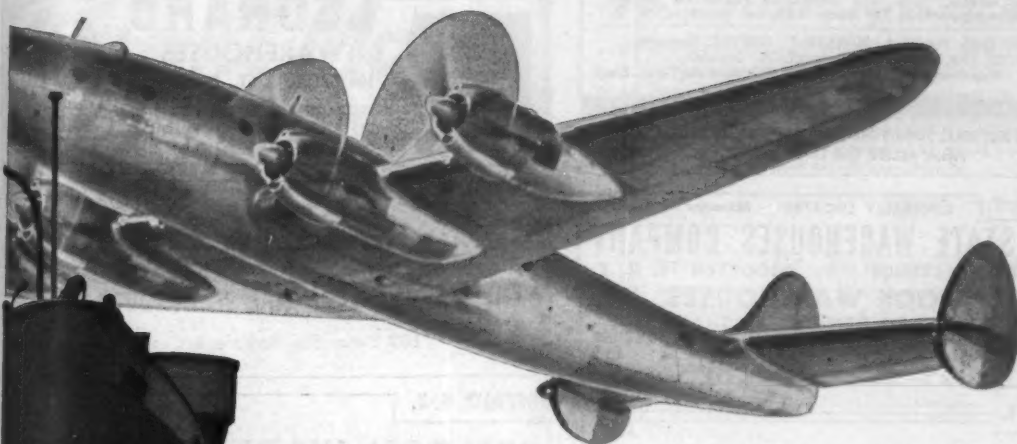
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During the war the services of supply discovered that many shipping and handling economies were possible through the use of unit loads. Matthew W. Potts writes about the commercial implications of unit loads on page 40.

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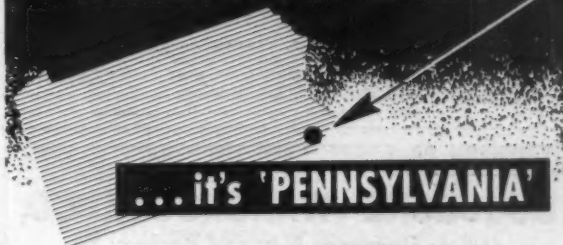
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For a report of progress made in pallet simplification read the article by W. E. Braithwaite on page 42.

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H. Frederick discusses this problem in an article on
page 54.

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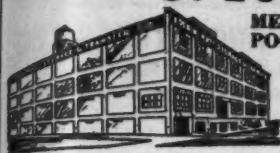
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How does an organization accomplish 10,000,000 physical
handlings a day? C. G. Peterson, chief engineer, Rail-
way Express Agency, describes his company's handling
system on page 81.

and Firms are Arranged Alphabetically

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For economical storage and distribution you will want to know more about our individualized services. Our fireproof warehouses are in the Southgate Terminal, on the waterfront and in the center of Norfolk's wholesale district. Served by all rail, water and motor lines.

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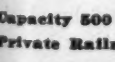
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 Waterfront Facilities
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 Modern Handling
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 lines

Complete local and over-the-road truck services with 70 units of all types of equipment, including low-bed trailers, winches and cranes.
 Aero-Mayflower moving and storage

Surplus . . .

(Continued from page 84)

preferred sources for transport of essential types of freight, will place such a burden on the transportation system of the nation that its already limping facilities will be further slowed down. Carriers have not been able to obtain the equipment and installations long on order but still unfilled. There is apprehension that this potential situation may force repeated embargoes so that the most necessary products may have precedence.

It is the policy of the War Assets Administration to place responsibility for the actual disposal transaction upon the field officials. Policy is made in the Capital, but its execution is the fruit of the kind of men who hold the jobs in the 33 centers scattered about the country. There is no doubt that the men who are in charge in Washington are almost without exception persons of principle and integrity. They try to make practical plans, and outline workable programs; most of them are men chosen from industry for their abilities and experience of the specific part of the WAA program they administer.

Stowage . . .

(Continued from page 79)

cent of all commodities do not exceed 15 cu. ft. and that the average package is about 1½ cu. ft. The average express package weighs 21 lb., or at 12 lb. per cu. ft. has a volume of 1¾ cu. ft. All the commodities above 15 cu. ft. appear to be in the industrial class, heavy machinery, textiles, etc.

Fairly comprehensive time studies of cargo loading and unloading of some common types of express transportation also have been made to ascertain loading time factors for various types of plane cargo compartments under different conditions. The loading time and unloading time for a given cargo compartment under similar conditions can be considered to be similar. Table 1 shows the time factors, not including tie down, for various types of cargo compartments.

With the exception of fork trucks, and tractor trailer trains, most equipment now being used at airports will not serve modern transport planes efficiently particularly at combination passenger and cargo airports.

Loading . . .

(Continued from page 48)

veloped by Evans Products Co. that seems to point the way for future development in this class of equipment. This loader is installed in a standard freight car.

Vertical steel plates are installed permanently at suitable intervals. Short wall members are supported between each pair of adjacent vertical plates, and are adjustable at ½ in. intervals vertically. Finally, cross members of Z-bar and wood construction are supported upon these wall members, and are adjustable at ½ in. intervals horizontally. This construction allows complete flexibility for loading in all dimensions.

The wall and cross members are stored upon the upper sides of the cars, supported on the vertical plates, when not in use. Normal use of the car without the loading equipment is possible when desired.

Increased car loading is possible with this equipment. Light weight fragiles, such as crackers, can be stacked to the car roof by placing cross members in position to serve as a second flooring for the upper portion of the load.

and Firms are Arranged Alphabetically

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CENTRAL STORAGE AND WAREHOUSE COMPANY

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3. Negotiable Warehouse Receipts
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4. Burglary Protection; Bonded
Employees
5. Complete Warehouse System
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DIVISION OF P & V-ATLAS INDUSTRIAL CENTER INC.
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MILWAUKEE, WIS.

WISCONSIN'S LARGEST

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WAREHOUSE SERVICE! RAILROAD SIDINGS
OF EVERY DESCRIPTION AND DOCKING FACILITIES

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Automobile storage. Warehousing on unit basis for spot stocks. Storage
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200,000 SQ. FT. OF MODERN FIREPROOF SPACE
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With the Service Electric Hydraulic Lifter any light socket in your plant is a power source for lifting up to 1000 lbs. . . as high as 8' 8" . . . by simply pressing a button. This is the practical equipment to lower handling costs as you lift heavy loads more efficiently . . . to make the handling of dangerous loads easier and safer for your men.

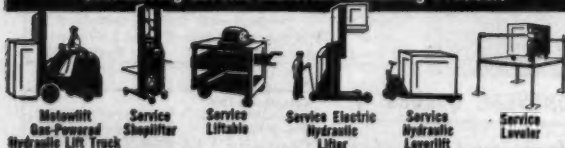
With twin roller lifting chains, either of which will safely hold the load . . . push button control . . . safety valve to prevent overloading . . . all the other features listed here . . . this new better Service Electric Hydraulic Lifter deserves a spot in your plant.

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Features Like These Will Cut Your Handling Costs

- Lifting speed 10 feet per minute.
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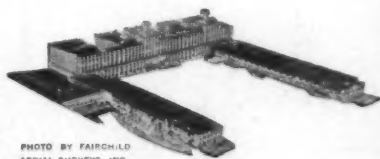


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